The Book of Canada

CALIFORNIA

The BOOK OF CANADA

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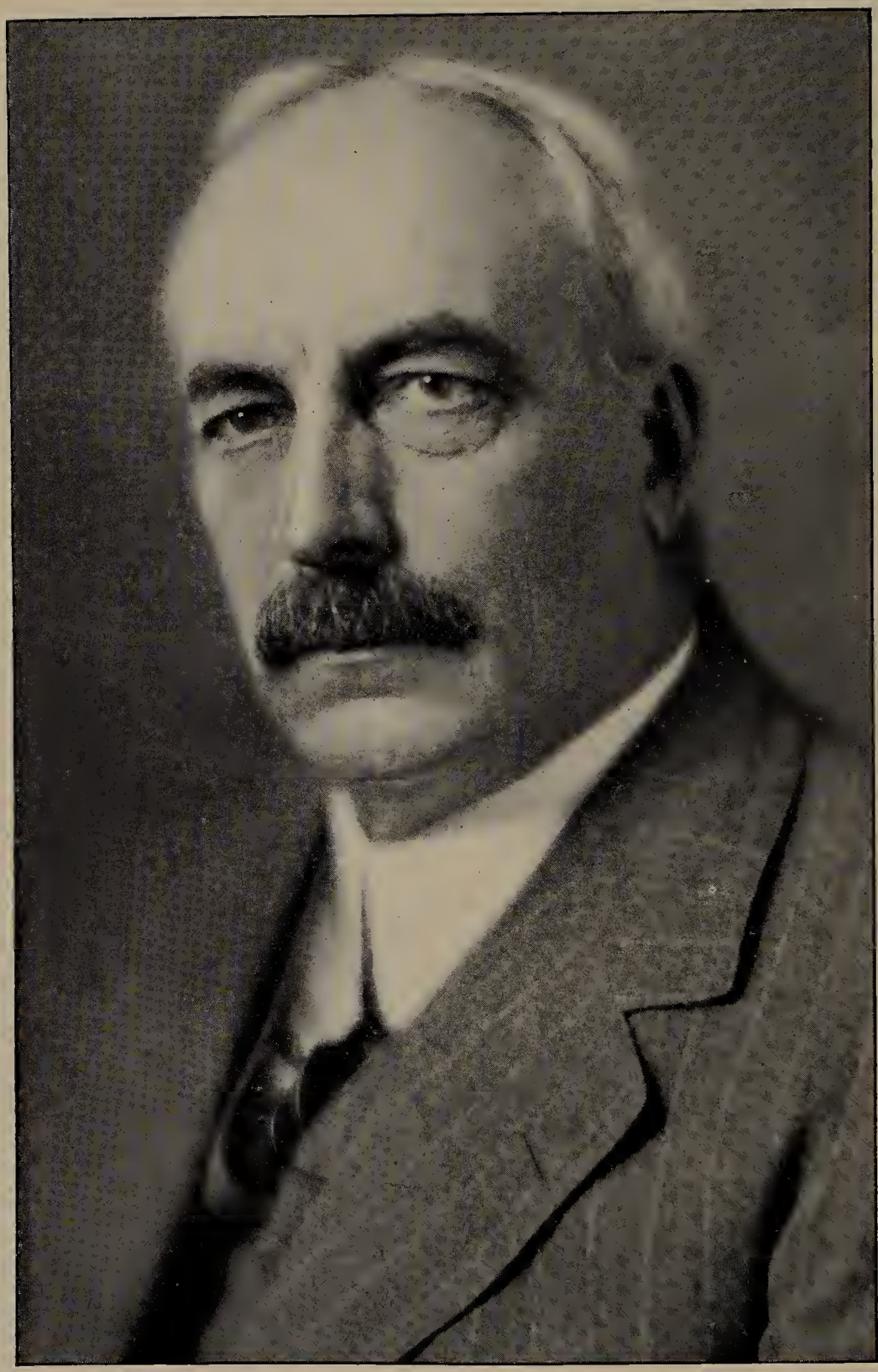

WILLIAM HARVEY SMITH, M.A., M.D., C.M.

President-Elect, British and Canadian Medical Associations, 1930

THE BOOK OF CANADA

Published By

THE CANADIAN MEDICAL ASSOCIATION

On the Occasion of

THE MEETING OF THE BRITISH MEDICAL ASSOCIATION

IN WINNIPEG, AUGUST 1930

Edited By

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TORONTO
1930

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FOREWORD

THE generosity of many contributors, whose names appear in our list of contents, has made possible this volume in commemoration of the meeting of the British Medical Association in Winnipeg, August, 1930. The fact that busy men have taken the time to compile so comprehensive a series of special articles bearing upon characteristic features of Canadian history and development, must be taken as a tribute alike to the occasion and to the esteem in which the British Medical Association is held in this country.

For the illustrations our indebtedness to the Royal Canadian Air Force, to various other government agencies, both federal and provincial, to the Hudson's Bay Company, and to many others, is gratefully acknowledged elsewhere in greater detail. Special reference ought perhaps to be made to the introductory greetings of His Excellency the Governor-General and the Right Hon. W. L. Mackenzie King, Prime Minister of Canada, and to the special articles contributed by the provincial prime ministers on the characteristic features of the several provinces of the Dominion. To each an appeal was made to commemorate the national aspect of so notable a gathering, and the result will attest the generosity of their response.

C. M.
W. S. W.
T. C. R.

Dominion Day, 1930

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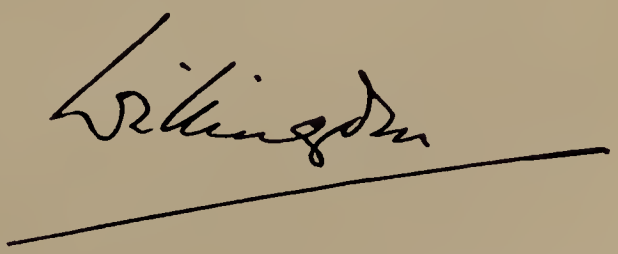
HIS EXCELLENCY THE RIGHT HON. VISCOUNT WILLINGDON,
G.C.S.I., G.C.M.G., G.C.I.E., G.B.E.

Governor-General of the Dominion of Canada

MESSAGE FROM THE GOVERNOR-GENERAL OF CANADA

THERE can be nothing more helpful in producing closer co-operation within the British Empire than the interchange of visits by distinguished members of the various professions in our public life, and nothing has given me greater pleasure during my life in Canada than to realize the steady increase in the number of delegations which have come to and have gone from this country to other countries within the Empire in order to discuss, for their mutual advantages, matters connected with the improvement of the efficiency of their particular branch of public service.

It is therefore with the greatest satisfaction that I join with all the members of the Canadian Medical Association in greeting their fellow members of the British Medical Association, and trust that the results of their Conference at Winnipeg may secure the best possible results in adding to the efficiency in the administration of the great profession to which they belong, and in increasing that mutual knowledge and understanding of each other, that unity of purpose which is essential to the co-operative development of all parts of the British Empire, to which we look forward in future years.



Government House, Ottawa

THE RIGHT HON. W. L. MACKENZIE KING, P.C., C.M.G., LL.D.

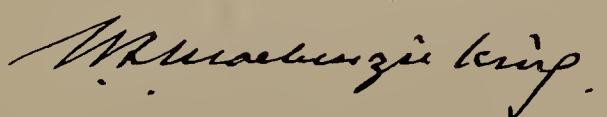
Prime Minister of Canada

MESSAGE FROM THE PRIME MINISTER OF CANADA

CANADA is greatly honoured in again being chosen by the British Medical Association for its annual meeting, and the Government and people of Canada join with the members of the medical profession in extending the warmest of welcomes to our distinguished visitors.

From its foundation, almost one hundred years ago, the Association has concerned itself with the promotion of scientific research and the education of the people in health matters, as well as devoting itself to the interests of the medical profession. Its achievements are known and recognized, not only in all parts of the British Empire, but throughout the world as well. It is not too much to say that no other vocational organization can be compared with the British Medical Association in respect of the scope and variety of its work or its standing in the eyes of public authorities.

With the spirit and purpose of the Association all Canadians are wholeheartedly in sympathy. On their behalf I wish to express the hope that this year's meeting in Winnipeg, which is the ninety-eighth annual meeting of the Association, may prove to be the most successful in its history.



Ottawa, Canada

WINNIPEG, LOOKING DOWN PORTAGE AVENUE EAST

By Courtesy of the Royal Canadian Air Force

THE PLACE OF MEETING: WINNIPEG

By Chester Martin, M.A., LL.D.

FOR the third time in nearly a century the British Medical Association is meeting outside Great Britain. The place of meeting is one of the British Dominions and the Book of the Meeting is therefore a *Book of Canada.* The City of Winnipeg, which has been conspicuous more than once for its national outlook has been the first to recognize the national aspect of such a meeting, and the propriety of sharing, if need be, the honours of the occasion with the whole Dominion.

Behind this propriety, however, there are substantial reasons why Winnipeg has been selected to represent the characteristic features of Canadian development and history. It is situated very nearly at the land-centre of the continent. The province of which it is the capital was called by Lord Dufferin the key-stone of the arch of British provinces across the continent. In a very real sense it determined the destiny of Canada a whole generation before it became part of the Dominion, for had it followed—or preceded—Oregon into the American Union during the 'forties, a transcontinental British Dominion would have been forever impossible. It is here that the more distinctive interests of east and west, and it must now be added, of the north also, meet and fuse and react upon each other. Winnipeg has long been the focus for western traffic converging eastward and the distributing point for eastern traffic radiating westward. For the development of the North and in the uncharted fields of air transportation where the "great circles" of northern latitude will be increasingly important, both Winnipeg and Churchill may well be focal. But these signs of

the present and the future are characteristic also of the past. "The Forks" of the Red and the Assiniboine Rivers formed the strategic centre alike for the discoverer, the fur-trader, and the colonizer. The key to the whole story of the West has been geography.

Four Historic Routes

There have been four historic routes to the Red River district, each charged with a distinctive destiny for western Canada.

For two hundred years the normal approach was by way of Hudson Bay. It was only five years after Champlain founded Quebec upon the St. Lawrence for New France that Captain Button passed the winter of 1613 at the mouth of the Nelson and claimed that whole vast territory for King James of England. What is now the Canadian West is thus the oldest continuously British territory upon the North American continent. In 1670 the Hudson's Bay Charter of King Charles II bestowed upon the "Gentlemen Adventurers of England trading into Hudson's Bay" an iron-bound monopoly of trade, property, and government that was not surrendered until 1870. For two centuries the flag of the Hudson's Bay Company was the emblem of British rule from the St. Lawrence watershed to the Pacific. In 1857 it floated over more than a quarter of the continent, and it was by way of Hudson Bay that fur-trade and settlement alike were planted in the West.

A second approach, infinitely more toilsome and dangerous at that time, lay through the net-work of rivers, lakes, and portages from New France. The journals of the fur-traders have recorded more than sixty lakes, nearly three hundred portages where it was necessary to transport the cargo by land, and nearly one hundred and sixty portages where canoe and cargo alike had to be taken from the water. By this route of endless toil and danger came La Vérendrye and his party to "the Forks" in 1734. Theirs were the feet of the first white men to tread the soil of the City of Winnipeg, and the rude fort which they built—Fort Rouge— has given its name to a

ward of the modern city. When Canada too became British in 1763 the British trader exploited the fur-trade with hard and ruthless energy. One priceless advantage he had to counterbalance the toil and danger of the route: he could intercept the Indians and their precious furs on the way to the Bay. Before long the Hudson's Bay Company found it necessary to leave their snug quarters on the shore of Hudson Bay and to fight for the furs in the interior. It was at Red River in the throes of this conflict that settlement was begun in 1812 under the dominant influence of Lord Selkirk and the Hudson's Bay Company. Here too the contest reached its bitter climax on June 19, 1816, when more than twenty of the settlers were left upon the prairie, after the affray of Seven Oaks. The fatal rivalry came to an end only in 1821 by the coalition of the two fur companies under the historic charter and name of the Hudson's Bay Company. For the Canadian water-route the coalition of 1821 was fatal. "The back-door from Canada" was closed, and the mysterious trade by way of Hudson Bay resumed again its silent and mysterious sway. Not until the coming of the railway half a century later were the direct contacts with Canada again resumed.

A third approach to "the Forks" seemed for many years to forecast the destiny of Red River. During the 'fifties and the'sixties of last century a deluge of American settlement—more than two millions in ten years—poured about the Great Lakes and set like the Gulf Stream westward and northward to the Red River. Nothing but the little Red River Settlement and Fort Garry at "the Forks", in all probability, saved the Red River Valley at that time for the future Dominion of Canada. By 1856 a thousand Red River carts plied regularly to the American outposts at St. Paul. As late as 1869 the governor of the Hudson's Bay Company himself believed that annexation to the United States was inevitable. Even the first railway contact with the outside world came in 1878 from St. Paul to Winnipeg; and long after the transfer of the West from the Hudson's Bay Company to Canada in 1870 the menace of annexation continued.

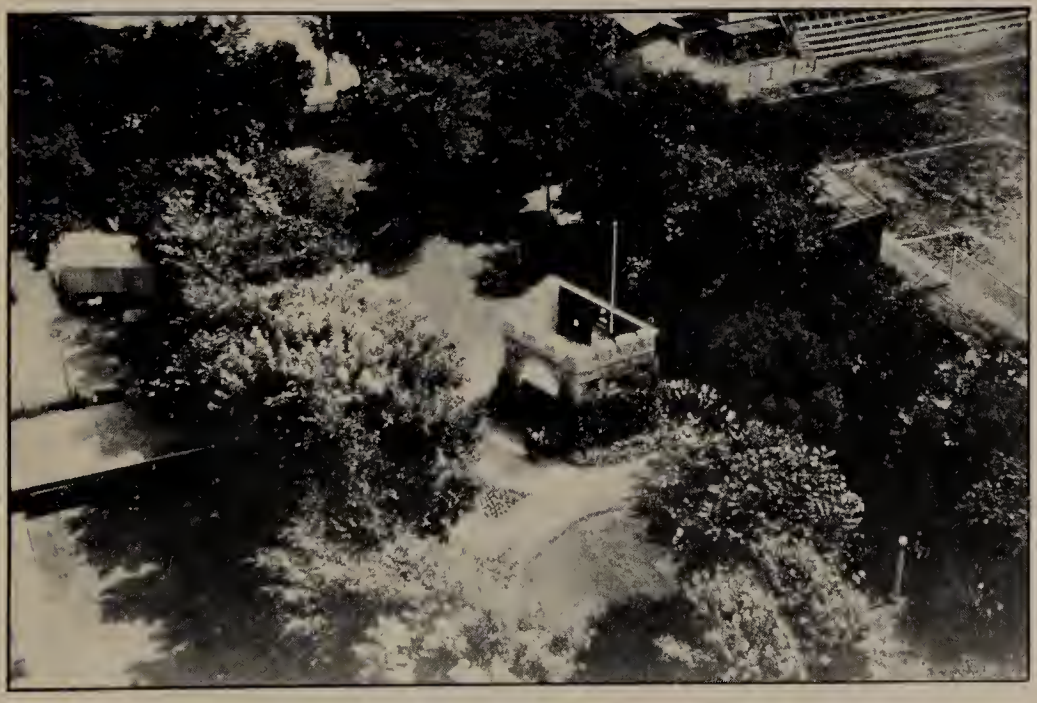
The fourth approach to Red River—the long and costly route from Canada by rail north of Lake Superior—was thus, like the westward expansion of Canada itself, almost in defiance of nature. The famous "monopoly clause" of the Canadian Pacific Railway charter forbade branch lines running south-east within fifteen miles of the border. But the price was the price of a transcontinental Dominion, and royally has the investment paid in the life of the Canadian nation. With the completion of the C. P. R. in 1885, and the lines which now form the Canadian National, Winnipeg became a truly Canadian city. The completion also of the Hudson Bay route in 1929 is thus a curious and historic reversion to other days. Two centuries and a half ago British seamen and traders sought here a route to the Indies and found instead an undiscovered frontier. To-day the Canadian West seeks by this historic route an outlet to the markets of the world.

Four Pages of History

It would be hard to find a more picturesque variety of scene and background than the site of modern Winnipeg in three or four characteristic pages of its history.

The first (1817) might appropriately be taken from the earliest days of settlement at Red River. Nearly a century had passed since the simple entry in La Vérendrye's journal had recorded the landing of the first white men at "the Forks". By 1817 every vestige of La Vérendrye's Fort Rouge had disappeared, and even the very site of his headquarters at Fort Charles on Lake of the Woods had been forgotten. With the British conquest of Canada had come the traders of the North West Company. At "the Forks" stood the oak palisades and "hangards" of their trading-post, Fort Gibraltar, near the present site of the Union Station. It was not until August 30, 1812, however, that the first band of permanent settlers reached the Forks by way of Hudson Bay. Here the deed of Selkirk's grant from the Hudson's Bay Company was read with imposing ceremony to the officials of both companies and to settlers, Métis, and

LOWER FORT GARRY



GATEWAY, OLD FORT GARRY

By Courtesy of the Royal Canadian Air Force

Indians assembled for the occasion. A few weeks later the first wheat in the West was sown at Point Douglas, within the boundaries of the present city of Winnipeg.

But for many years the Red River Settlement was nearly strangled by the trade war between the fur companies. Driven off by the Nor'-Westers in the spring of 1815, the settlers returned in the autumn reinforced by a band of Sutherland highlanders under an enthusiastic new governor. At Fort Douglas, now commemorated by a cairn near the C. P. R. station, Governor Semple described to Selkirk how they laughed and danced and sang as they contemplated their abundant harvest of wheat and their prospective stores of "pemmican" and "titameg" (whitefish) for the winter.

The next spring, however, the feud between the two fur companies broke in all its fury. The North-West Métis were bidden to prepare for the fray and to meet the winter-partners of the Company from Fort William at "the Forks" in June. Governor Semple rashly seized Fort Gibraltar and burnt it to the ground. On June 19 a boy on the watch-tower of Fort Douglas spied the Métis crossing the prairie to effect their junction with the "brigade" from Fort William. With amazing rashness Governor Semple led a party from the Fort to intercept them, and at Seven Oaks in the gathering dusk of a long June day more than twenty of the settlers fell victims to all the savagery of Indian warfare.

The government at last now intervened, and in the summer of 1817 Selkirk himself appeared upon the scene. Upon the banks of the Red River near the present site of St. John's Cathedral, he gathered the highlanders and fixed sites for school and church, mill and bridges, public roads and an experimental farm. "So correct and unerring was his judgment," writes a chronicler of those days, "that nothing he planned at this early date could in after years be altered to advantage." The grandson of one of those settlers was one day to be archbishop at St. John's and primate of all Canada. Many vicissitudes of nature—floods and locusts and prairie fires—were yet to come, but this first page of history at "the Forks"

closes with permanent settlement at Red River an accomplished fact. The City of Winnipeg was now a matter of time.

Another page may be taken at the "golden age" of the Red River Settlement. The rival fur companies had united in 1821. Old Fort Douglas had been abandoned for the first Fort Garry near the site of old Fort Gibraltar, and during the 'thirties this in turn had been abandoned for the historic Upper Fort Garry with walls and bastions of solid masonry. The northern or governor's gateway of this old fort as enlarged in 1860 still stands near the Fort Garry Hotel. Twenty miles down the river also was built the Lower Fort, which still remains almost intact, perhaps the most picturesque reminder of the early days in Western Canada.

The placid round of life at Red River in the 'forties was known to many a traveller and found its way through books and newspapers to the great world beyond. The poet Whittier wrote of

> The bells of the Roman mission,
> That call from their turrets twain
> To the boatman on the river,
> To the hunter on the plain.

At Fort Garry, where the Old Company ruled in patriarchal dignity, "the beaver hat and silken gown, the papered walls and carpeted floors meet the eye". Those who do not already know Ross's *Red River Settlement*, one of the earliest classics in our history, will find in the old sheriff's pages not only a description but a demonstration of Red River culture. A generation later Hargrave describes the great common room at the Fort, the tables covered with newspapers, the long broad plugs of cavendish in the corner, the great open fireplace, the officers' mess in the governor's quarters, adorned with Indian art in barbaric splendour.

Among the settlers, the life was simple, and care-free, full of contentment and primitive comfort. The doors went unlocked. The ponderous correspondence and deportment of the Hudson's Bay officials set the standard

RED RIVER CARTS LEAVING FORT GARRY, 1863

By Courtesy of the Hudson's Bay Company

of manners; honesty, hospitality, much simple piety, and elaborate courtesy to strangers passed into a code of conduct. Litigation was little more than arbitration. As retired officers of the Company in increasing numbers settled at Red River, schools flourished and historic churches like St. Andrew's and Kildonan arose upon the river-banks.

Across the river their neighbours, the care-free Métis, lived the adventurous life of the plain-ranger, the "freighter", or the fisherman for the autumn runs of the titameg or whitefish. But the adventure and wild freedom of the buffalo hunt was the distinctive attraction of the French Métis. The summer hunt usually left the Settlement in June, the autumn hunt in August. In 1820, according to Sheriff Ross, 540 Red River carts—two-wheeled carts built of wood and shaganappi or raw buffalo-hide thongs without an ounce of iron—left for the plains. In 1840 Ross counted 1,210 carts and more than 1,600 mounted huntsmen, women, and children in the buffalo-hunt of that year. The muskets, powder and bullets, the knives, kettles, saddles and trained ponies for the hunt represented a capital of £24,000. The long train of creaking Red River carts moving out with a pandemonium of discordant noises to the muster on the plains, the stern discipline of the camp enforced with ruthless severity by ten captains with ten men under the command of each, the skill of the guides in directing the hunt, and finally the stampede itself, when 400 mounted horsemen, loading and firing in full career, brought down 1,300 buffaloes in a single "run", all moved "with the regularity of clockwork".

The meat was cut into thin strips, dried in the sun, beaten into flakes and packed into bags of buffalo-skin, into which molten fat or marrow was finally poured. For trapper and settler alike the "pemmican" thus prepared remained for generations a staple food in the West. The buffaloes were to be found in almost incredible numbers. The younger Henry describes a moving sea of them as far as the eye could reach, passing his trading-post for two days. When the railway came through, eight car-

loads of buffalo bones were shipped from a single little station on the C. P. R. to eastern Canada.

As contacts grew with the outside world, and this wild freedom was threatened by the railway, the printing-press and a deluge of immigration from the east, the French Métis under their trusted leaders proved capable, at the Riel Insurrection, in 1869-70, of dominating the Settlement for nine months until terms, to their satisfaction, were made for the creation of Manitoba as a Canadian province. The first newspaper, the *Nor'-Wester*, edited and printed by two enterprising young Canadians, had appeared at Red River in 1859. As early as 1857 a select committee of the British House of Commons—of which Gladstone was a member—had advised the transfer of the Red and Saskatchewan River valleys to Canada. The day of the plain-ranger in Rupert's Land was over.

The City of Winnipeg

The transfer to Canada took place at last in 1870, and the province of Manitoba—less than one-fifth of its present size—was thus the first new province to be added to the original Confederation.

When the Wolseley expedition marched into Fort Garry in 1870 there were scarcely more than a score of houses clustered in the immediate vicinity of Fort Garry. It was this little village of merchants, outfitters for the buffalo-hunt and free traders in furs in competition with the Company at Fort Garry, that formed the nucleus of the incorporated city of 1873; and the name adopted by them was confirmed in the charter of incorporation. One of them has left a picture of the plain-traders and buffalo-hunters in this primitive village of Winnipeg. "With drinking, gambling, fighting, dancing, laughing, talking, swearing, horseracing, trading and singing, they made a perfect babel of the place. . . . We had no bank [adds Begg] no insurance office, no lawyers, only one doctor, no City Council, only one policeman, no taxes—nothing but freedom." The same observer notes the first theatrical performance in December, 1870, the arrival

CANADIAN PACIFIC RAILWAY, FREIGHT YARDS, WINNIPEG

PARLIAMENT BUILDINGS, WINNIPEG

By Courtesy of the Royal Canadian Air Force

of the first stage-coach from the south, the opening of the first public school, the completion of the first telegraph line and the meeting of the first legislature in 1871, the last delayed by the non-arrival of the lieut.-governor's Windsor uniform. Within a year or two, half a dozen newspapers including the *Free Press* (November 9, 1872) had sprung into life. "A boot black [we read] arrived in Winnipeg during the summer of 1873 but our mud was too much for him and he soon gave it up." Mass meetings were the order of the day—"it was a mass meeting age"— until a mass meeting was called to quell the nuisance. Two years after incorporation the population was estimated at 5,000. By 1878 there was settlement for 250 miles west of Winnipeg The previous year Lord Dufferin, the governor-general, had driven the first spike for a railway to the south, and a few days later the first locomotive for construction work had come down the Red River by river-boat, with steam up, the whistle blowing, the bell ringing, and "a perfect babel of noise" from the river-banks.

With the completion of the Pembina branch in 1878 a flood of immigration at last reached the city. The population doubled in a single year. The boom of 1879-80 is still a tradition. Lots on Main Street were quoted higher than on Michigan Avenue in Chicago. Whole townsites were sold at auction in a single evening until the auctioneer was advertising "Edmonton at last . . . . in the centre of the richest Gold, Coal, Timber, Mineral and Wheat producing regions in America". With the collapse of the "boom" came a readjustment which tested to the utmost the spirit and courage of so young a community. Many of the professional speculators moved on to fresh fields of exploitation. Those that remained turned to face the future with a sturdy reliance upon slower but surer modes of prosperity—the toilsome thrift of agriculture, industry, and commerce. The survivors may well claim to have laid the foundations of modern Winnipeg. In closing his narrative of *Ten Years in Winnipeg*, Alexander Begg could already note a certain confidence of manner "typical of western

enterprise". In many respects this spirit of early Winnipeg was truly prophetic, for the most characteristic feature about Western Canada has been, after all, not its prodigious size and magnificent distances, but the spirit of the Western Canadian people.

Winnipeg of To-day

In all but this characteristic enterprise and resourcefulness the present city is a startling contrast to that of a generation ago. The change from a straggling village to a city of more than 200,000 has taken place within the lifetime of men now living. From its incorporation to 1927 the office of sheriff was held by one man. But while the change, to many who have seen it, may have been almost imperceptibly gradual, the cumulative results, decade by decade, have been more tangibly recorded by the statistician and the photographer. The present skyline of Portage Avenue would be scarcely recognizable to a visitor who had not seen the city since the Great War.

More striking than the changes in physical appearance have been certain developments in civic policy which have made the City of Winnipeg distinctive, not only in Canada, but in North America. These rather than detailed statistics of industrial growth may be expected to interest the casual visitor.

A prosperous publicly-owned municipal hydro-electric system, in healthy and stimulating competition with the resources of the privately owned Winnipeg Electric and Manitoba Power Companies, has resulted in the cheapest electricity on the continent. Of the 800,000 horsepower on the Winnipeg River, more than 300,000 from the Pinawa, Pointe du Bois, and Great Falls plants, are already available, and over 300,000 more are now being developed at Slave Falls and Seven Sisters. Winnipeg, it is claimed, uses more domestic electricity *per capita* than any other city in the world—three times the amount of any city in the United States, and half as much again in total volume as the city of Glasgow with a population more than four times as large. The average rate for

lighting purposes is 2½ cents per K.W.H. The average domestic rate for all purposes is 1.007 cents per K.W.H.; for heating and cooking, nine-tenths of a cent per K.W.H. Industrial power is supplied in some cases as low as four-tenths of a cent per K.W.H.

The Winnipeg Electric Railway operates more than 300 cars on 120 miles of track covering in all some 10,000,000 miles of traffic per year. The average fare is 5.86 cents.

A publicly-owned central-heating system for the business section of the city utilized, in 1928, over 77 million K.W.H. of off-peak power at one-tenth of a cent per K.W.H.

The story of the Greater Winnipeg Water District is a similar record of civic enterprise. A practically inexhaustible supply of excellent water is brought 96 ½ miles from Shoal Lake with an elevation of 294 feet above the City of Winnipeg. The capacity of the main viaduct is 85,000,000 imperial gallons per day.

The importance of Winnipeg as a grain centre is more widely known; it is not only one of the most important on the continent, but one of the chief cash grain markets of the world. The Winnipeg Grain Exchange and the headquarters for the gigantic organizations of the Canadian Wheat Pool—said to be the largest co-operative marketing association in existence—are in Winnipeg. Wheat receipts for the year 1928 were more than 318,000,000 bushels. More than 2,000 cars of Canadian wheat are inspected and graded every day during the busy season—a train-load of 40 cars of grain every 28 minutes, or a car and a half a minute, night and day.

The railway freight-yards of the C.P.R. in Winnipeg are said to be the largest in existence belonging to a single company; and the stock-yards near Winnipeg the largest in the British Empire. Without yielding to megalomania, it will be sufficient to summarize other features of the city in the form of official statistics. The telephone system of Manitoba, like the Winnipeg Hydro-Electric, is a convincing demonstration of public ownership. Within the City of Winnipeg there are 50,000

telephones in use, with eight automatic exchanges and a net-work of long distance lines to every point in the province. The three main thoroughfares of the city are 132 feet in width. There are 500 miles of city streets, including 156 miles of boulevards; 34 public parks with an area of 830 acres; 67 schools in the Public School system of the city with an enrolment of 45,000 students from a population of 205,000. The retail shopping facilities of Winnipeg, reflecting the enterprise of firms like the T. Eaton Co. and the historic Hudson's Bay Company, are in many respects perhaps unexcelled. A powerful press is widely read and quoted throughout Canada. The University of Manitoba with its affiliated colleges stands third in total enrolment among Canadian universities.

The medical school, under the able and statesmanlike headship of Dr. Chown and Dr. Prowse has had a remarkable development. Incorporated as early as 1883, it deeded its valuable and unencumbered property and equipment to the University of Manitoba in 1918, and became an integral part of the university. The school has a Class A (the highest) rating, with a course of seven years—two pre-medical, four medical, and one interne.

No fewer than nine hospitals are on the "fully approved" lists of the American College of Surgeons. St. Boniface, the oldest in point of time, began in 1871, under the Grey Nuns, with four patients. It now contains 600 beds. The Winnipeg General Hospital, in close co-operation with the medical school, has 700 beds, and was the first in Canada to organize a social service department. Worthy of remark also are the Misericordia Hospital with 225 beds, the Children's and Shriners' Hospital with 133, Grace Hospital of the Salvation Army with 200, Victoria, St. Joseph, and two municipal hospitals, the King George and the King Edward, for infectious diseases. The vital statistics reflect these medical facilities. The death rate per 1,000 is 7.71; infant mortality, 58.6 per 1,000 live births; pulmonary tuberculosis, 40.5 per 100,000 of population.

"UNDER THE DOME"

Rotunda of Legislative Building, Winnipeg, showing Brangwyn Mural

The hours of sunshine are exceptionally high—2,172 hours, or 49 per cent.

The future of Winnipeg, like its past, can scarcely fail to be determined by geographical considerations. Once an isolated primitive settlement, the "ultima Thule" of civilization, the outpost of British interests west of the Great Lakes, it is now the capital of a maritime province at the centre of the continent, the financial centre for the development of vast and almost unforeseen resources.

Happily the province of Manitoba is receiving back, in 1930, on the occasion of its sixtieth anniversary as a Canadian province, the full control of these resources from the Dominion. What the mining resources of the northland, the unrivalled water-powers of the Nelson, the rapid development in air transportation in high latitudes, may hold for the future, it would be rash to conjecture. Adapted by tradition and environment, however, to mediate between east and west, the City of Winnipeg may be expected to maintain in the process a national outlook towards the distinctive interests of the prairie, the factory, and the sea, at a point where disruption would be well-nigh fatal to the welfare of a harmonious confederation. No greater task than this is to be found, in the national life of Canada, if Selkirk's prophecy at the beginning of the nineteenth century is to be in any measure fulfilled in the twentieth. "It is a very moderate calculation," he wrote, "to say that if these regions were occupied by an industrious population, they might afford ample means of subsistence for thirty millions of British subjects."

THE STORY OF CANADA

By W. Stewart Wallace, M.A.

CANADA is officially styled a "dominion" of the British Empire. How this especial name came to be applied to it is explained by a curious story. In December, 1866, there met at the Westminster Palace Hotel in London a number of delegates from Canada, New Brunswick, and Nova Scotia, to discuss with representatives of the British government the details of the British North America Act—the Act which in 1867 created the Dominion of Canada. At this conference there arose a difference of opinion as to the proper term to be used to describe the new federation. Sir John Macdonald, the leading Canadian delegate, was in favour of calling it "the Kingdom of Canada"; but Lord Derby, the British foreign minister at that time, was afraid that the term "Kingdom" would wound the tender susceptibilities of the people of the Great Republic to the south of Canada. On the other hand, the Canadians were firm in rejecting the term "colony". The session broke up without coming to a decision; but that night Sir Leonard Tilley, one of the delegates from New Brunswick, following a life-long custom, read a chapter of the Bible before retiring to rest. It happened that the chapter he read was the seventy-second Psalm, in which occurs the verse, "He shall have dominion from sea to sea, and from the river to the ends of the earth." This seemed such an apt description of what the new federation hope to be that Tilley hit upon the idea—so the story goes—of calling it "the Dominion of Canada"; and the Dominion of Canada it became.

It is only fair to say that some doubt has been cast on the truth of this story. It depends on the evidence of Sir Leonard Tilley's second wife, who did not become his

wife until a year later. The federation of 1867, moreover, did not extend "from sea to sea", but only from the Atlantic to Lake Superior. Finally, it should be observed that the term "dominion" was not new in colonial history, for the colony of Virginia had been known, at an early period, as "the Old Dominion." But none of these objections is really strong enough to discredit the story; and the probability is that it is near the truth. In any case, it has obtained general credence; and the arms of the Dominion of Canada now bear, in allusion to this story, the legend *A mari usque ad mare* (From sea to sea).

As a dominion, it will thus be seen, Canada is a very new country. It is only three years since it celebrated its diamond jubilee; and not sixty years have elapsed since it was extended, by means of the inclusion of the Hudson's Bay Company's territories and British Columbia, from the Atlantic to the Pacific. Some of the provinces of Canada, however, have histories that stretch back over four hundred years; and the story of the discovery of Canada by Europeans may be said to begin about the year 1000 A.D., when the Norse settlers in Greenland may actually have wintered on what is now Canadian soil.

For practical purposes, it is true, the story of Canada begins with the discovery of America by Christopher Columbus in 1492, and the landfall made by John Cabot on Cape Breton Island in 1497—one year before Columbus reached the mainland of America south of the equator. John Cabot was, like Columbus, an Italian; but he had lived for many years in England; his crews were English sailors, and he had a commission from Henry VII of England. The English did not immediately, however, follow up his discoveries; and it remained for a Breton sea-captain named Jacques Cartier to discover, more than a third of a century later, the Gulf and River of St. Lawrence, and to plant the French flag on the shores of this great waterway which leads into the heart of Canada. The result was that the discoverers of Canada followed two channels of exploration. The French, following in Cartier's wake, pushed up the St. Lawrence valley to

the Great Lakes, crossed into the Mississippi valley (where they founded St. Louis and New Orleans), and eventually made their way across the prairies of the Great West to the foothills of the Rocky Mountains. The English, on the other hand, found their way into Hudson Strait and Hudson Bay; and from Hudson Bay the traders of the Hudson's Bay Company finally pushed westward also to the great plains. Here the two streams of discovery converged. Just a few years before the fall of New France in 1760, French and English traders met for the first time at a spot in what is now northern Manitoba; and from that point exploration was henceforth carried out by English traders, with the aid of French-Canadian *voyageurs*.

While the French and the English were thus rivalling each other in the exploration of Canada, they were at the same time engaged in an age-long duel for the mastery in North America. This momentous struggle—which has been immortalized in the glowing pages of Francis Parkman—is one of the most striking and romantic phases of modern history. It continued, almost without intermission, from the capture of Port Royal by the English in 1613 to the Peace of Paris in 1763—a period of exactly one hundred and fifty years; and the theatre of war stretched from Hudson Bay to the Gulf of Mexico and from Newfoundland to the Mississippi valley.

Canada has thus been, from the first, a battleground of "the two races". The struggle first became acute in Acadia. If Belgium was the "cockpit of Europe", Acadia (or Nova Scotia) was the cockpit of America. Settled originally by the French, it became in 1621 the scene of an abortive Scottish colony (whence the name Nova Scotia); in 1654 it was occupied by a force of New Englanders under an officer bearing a commission from Oliver Cromwell; and in 1690 it was again the victim of a hostile visitation from New England. But on each occasion it was handed back to France; and it was only after a fourth occupation of Acadia by the English in 1710 that it was finally ceded to Great Britain in 1713. Even then it continued a centre of unrest until the famous ex-

A CONTEMPORARY VIEW OF THE CAPTURE OF QUEBEC BY THE BRITISH IN 1759

Courtesy of the Public Archives of Canada

patriation of the Acadian French in 1755. By this time, however, the struggle had spread to other fields. The French threatened the English colonies in the rear by building a ring of forts down the Mississippi and Ohio valleys, and they attempted, under the gallant Iberville, "the first great Canadian", to drive the English from Hudson Bay. But English sea-power proved too much for them. Four times England launched her ships against Quebec. Sir David Kirke occupied Quebec from 1629 to 1633; Sir William Phips failed to reduce it in 1690; Sir Hovenden Walker came to disaster by shipwreck in the St. Lawrence in 1711; but in 1759 the combined naval and military expedition of Saunders and Wolfe brought low, once and for all, the lilies of France on the ramparts of Cape Diamond. Wolfe's victory over Montcalm on the Plains of Abraham on September 13, 1759, is justly famous; but what really brought about the fall of New France was not Wolfe's success, but the sea-power of Great Britain. Wolfe's army was merely a landing-party on a large scale; and the fate of Canada was not decided until the arrival of the British ships the next spring made it clear that Great Britain retained command of the Atlantic. The French empire in North America was strangled by the British navy.

By the Peace of Paris in 1763 the French possessions in Canada—with the exceptions of two small islands, St. Pierre and Miquelon, retained as shelters for French fishing-vessels—were handed over to Great Britain; and for ten years the Union Jack flew supreme from Hudson Bay to Florida. It is curious fact, however, that there was at first some question as to whether Great Britain should ask for the cession of Canada in 1763. There were few people at that time who had any conception of the possibilities inherent in Canada; it was, indeed, to most people, as it was to Voltaire, merely "a few acres of snow." A pamphlet controversy sprang up over the advisability of Great Britain taking, instead of Canada, the island of Guadeloupe in the West Indies. The chief reason for the cession of Canada was that the British government was anxious to remove from the English colonies to the south

the menace of French aggression. They took Canada, not for any intrinsic value it might possess, but mainly to prevent France from making use of it.

The conquest of Canada raised an interesting problem. There were in the colony in 1763 between 60,000 and 70,000 French Canadians, and only two or three hundred English-speaking inhabitants. What, under these circumstances, would be the attitude of the Protestant Anglo-Saxon conquerors of the colony toward the conquered French Roman Catholics? Would they attempt to convert the French-Canadians into English-speaking Protestants, on penalty perchance of being deported like the Acadians? Such appears to have been the policy at first contemplated. The royal proclamation which established civil government in the colony supplanted, by implication, the old French laws, and substituted for them English laws. The inhabitants of Canada were to have "the benefit of the laws of Our realm of England", whether they wanted them or not. Roman Catholicism was to be virtually proscribed; and there were to be appointed Protestant ministers and Protestant schoolmasters. Canada was to be transformed into a newer New England. But this policy broke down from the outset. Apart from the absurdity of attempting to impose a new system of laws on a country which had developed a system of its own—of interpreting, for instance, the provisions of the French seigniorial law in the light of the English law of free and common socage—it seemed to the first English governors of the colony the part of wisdom to conciliate the good wishes of the French Canadians. General Murray described the French Canadians as "perhaps the bravest and best race upon the globe"; and he urged all sorts of concessions in their favour. He even persuaded the British government to permit the appointment of a Roman Catholic bishop of Quebec, while the penal laws against Roman Catholics were still in force in England. His successor, Sir Guy Carleton (afterwards Lord Dorchester), took the same view of the situation as Murray; and his ideas were embodied in the Quebec Act of 1774.

This famous Act had important results. It was one of the contributory causes of the American Revolution; but at the same time it proved a corner-stone of the new British Empire which rose on the ruins of the old. In particular, it became a "charter of liberties" of the French Canadians, and so of all other non-English elements under the sway of the British sceptre. It gave the French Canadians their own civil laws, including the seigniorial tenure (the shell of which still exists in the province of Quebec); it gave the French language an official status; and it made the French Roman Catholic church an endowed, if not actually an established, church, by its authorization of the legal payment of the tithe. This measure, which anticipated by over one hundred years the recognition of the national rights and privileges of the Boers in South Africa, was dictated—it must be confessed—by military considerations. It was hoped to make Canada by means of it a *point d'appui* for British supremacy in North America during the American Revolution. But, whatever the motives of those who framed the Quebec Act, it gave the French Canadians "a place in the sun" in their native land.

The prospect was, at first, that Canada would remain a French colony of Great Britain. But events belied this expectation. The American Revolution resulted in the influx into Canada, Nova Scotia, and New Brunswick of tens of thousands of American loyalists who had been driven from their homes, and thus gave Canada for the first time a considerable English-speaking population. Later, an economic revolution in the Highlands of Scotland brought about an immigration into Canada of Scottish Highlanders; the Industrial Revolution in England turned the eyes of English craftsmen to Canada; and potato famines in Ireland led Irish peasants to migrate to the New World. By 1850 the English-speaking inhabitants of Upper Canada actually outnumbered the French-speaking inhabitants of Lower Canada—without taking into account at all the English element in the provinces by the sea. Early in the nineteenth century,

therefore, it became clear that Canada was destined to become a predominantly English-speaking country.

This change in the complexion of the population of Canada was not without its attendant difficulties. Among other things, it served to bring about in Lower Canada a struggle between "the two races" which culminated in 1837 in armed rebellion—though it must be added that the situation was complicated by other factors, which brought about, at the same time, a somewhat less serious revolt in Upper Canada. Lord Durham, one of the authors of the Great Reform Bill of 1832, who was sent out to Canada after the rebellion of 1837 as lord high commissioner, actually recommended that Upper and Lower Canada should be united with a view to submerging the French Canadians in the larger English-speaking population of the combined province. But at the same time he recommended that Canadians should be given the boon of self-government or, as it was called, "responsible government". The two provinces were united in 1841, but on such terms that, under responsible government, the French recovered in a short time the influence and power they had lost by the rebellion. Ere long the strife between "the two races" threatened to break out anew. Though the racial cleavage was not complete, one party came to rely chiefly on the votes of the *habitants*, and the other on the votes of the Scotch and Irish; and parties became so evenly divided that government came to an *impasse*. Government after government was formed, only to come to grief after a year of office, or a fraction of a year.

Out of this situation sprang the movement toward the union of all the British North American provinces. This idea of British North American union was not new. It had been mooted by the United Empire Loyalists; it had been a favourite project with both Tories and rebels; it had even received the blessing of Lord Durham. But it did not enter the field of practical politics until the breakdown of government under the Union. As Goldwin Smith later said, "The parent of Confederation was deadlock." It is true that the political situation was

A CLEARING IN THE FOREST

Courtesy of the Public Archives of Canada

not the sole factor involved. Both economic and military considerations were also influential. But the chief object of the Fathers of Confederation was to find a means of governing British North America which would obviate in Canada the racial rivalry between French and English, and would at the same time give the French a chance to realize their nationalistic aspirations.

The solution of this problem was found in the federation of the British North American provinces. These had had hitherto no organic connection, other than their common allegiance to the British Crown. But, just at the moment when the government of united Canada fell into chaos because of the political deadlock, news came that delegates from Nova Scotia, New Brunswick, and Prince Edward Island were meeting in Charlottetown, the little capital of Prince Edward Island, to discuss the union of the maritime provinces. Union, it will be seen, was in the air. The Canadian government thereupon sent representatives to Charlottetown in the summer of 1864 to invite the maritime province delegates to come up to Quebec in the autumn to discuss the larger question of the union of the British North American provinces. The invitation was accepted, and on October 10, 1864, there met in the ancient capital of New France what is known as the "Quebec Conference." The proceedings of this conference were carried on behind closed doors; and we know little of what went on behind those doors. But the outcome of the conference was the passage of seventy-two resolutions. These were the basis of the union of Canada, Nova Scotia, and New Brunswick consummated two years later at London, when representatives of these provinces framed with the British authorities the terms of the British North America Act of 1867, which created the Dominion of Canada.

The outstanding feature of the new Dominion was that it combined the advantages of central government with those of local autonomy. A central set of governmental machinery was created, with its headquarters at Ottawa; but at the same time the individual provinces retained their identity, and indeed "united Canada" was broken

up into the old provinces of Upper and Lower Canada (re-christened Ontario and Quebec), which thus regained their identity. To the Dominion was given oversight of such general matters as customs and excise, trade and commerce, militia and defence, railways and canals, and criminal justice; whereas the provinces retained control of education, property and civil rights, and other matters of local concern. This arrangement enabled the province of Quebec, for example, to preserve its peculiar institutions—its language, its civil laws, and its schools—while it gave to it at the same time the backing of the other provinces in matters of general concern, such as military defence, the building of railways, postal facilities, and so forth. There has been, at times, difficulty in drawing the line between the spheres of the Dominion and the provinces, and a good deal of litigation has resulted; but, on the other hand, the application of the federal principle to Canadian government has gone a long way toward solving the problem of "the two races" in Canada. Federalism has removed most of the sources of friction between the French and English in Canada; and while no one can pretend that all friction has disappeared, it has been reduced to a minimum, and has never since 1867 been really serious. When one considers the history of other countries—such as Ireland, Poland, or the Balkans—where people of diverse races and religions have been in close juxtaposition, one is struck by the fact, not that the French and English in Canada have had disagreements, but that they have got on together, on the whole, so amicably. The explanation of this extraordinary fact is to be found, without doubt, first in the generous treatment of the French after the conquest, and secondly in the federal system of government created in 1867.

The federation of 1867 included only Ontario, Quebec, New Brunswick, and Nova Scotia. But with astonishing rapidity the infant Dominion proceeded to extend itself from the Atlantic to the Pacific—*A mari usque ad mare.* In 1869 Canada acquired the vast territories of the Hudson's Bay Company's territories, out of which have been carved since that time the provinces of Manitoba, Saskat-

chewan, and Alberta; in 1871 British Columbia came into federation, and in 1873 Prince Edward Island. These accessions of territory gave to Canada an area greater than that of the United States, and a variety of natural wealth of the extent of which we are perhaps still ignorant.

Since the completion of the work of the Fathers of Confederation, the progress of Canada has been exasperatingly slow. The first transcontinental railway, the Canadian Pacific, though projected in 1872, was not completed until 1885. It was still in process of construction when there broke out in the North West territories a rebellion of the half-breeds and Indians which, though promptly crushed, discouraged the immigration of settlers into the fertile lands of the West for many years. During these years Canada remained in the commercial doldrums. It was only with the dawn of the twentieth century that settlers began to flock into the vacant spaces of the Dominion in large numbers. Then, indeed, a "boom" period began. Two new transcontinental railways were built, the Canadian Northern and the Grand Trunk Pacific (both now incorporated in the Canadian National Railways); new areas of cultivation were opened up; new sources of mineral wealth were discovered; new industries were established. A wave of optimism swept over the country, which Sir Wilfrid Laurier, the French-Canadian prime minister of the Dominion, happily epitomized when he said: "The nineteenth century was the century of the United States; the twentieth century will be the century of Canada." Then came the Great War. The stream of immigration and of capital into Canada dried up; development stopped; the new railways became bankrupt; the country acquired a burden of public debt such as no new country ever acquired before. The sale of her wheat and the manufacture of munitions enabled Canada to carry on during the crisis; but the dislocation of her economic life was profound. The end of the Great War found Canada once again in the throes of depression.

This was not in Canada, it must be understood, a ground for complaint. Canadians were, and are, proud

of the part their country played in the Great War. Canada sent overseas, between 1914 and 1918, approximately half a million men—no small contribution for a country of less than nine million inhabitants. On the battlefields of France, as well as elsewhere, Canadian soldiers acquitted themselves with distinction. The stand of the Canadians at the second battle of Ypres, when overwhelmed with clouds of German poison gas, the capture of Vimy Ridge, the conquest of Passchendaele, the battle at Amiens, and the glories of "the last hundred days", when the Canadian Corps acted as the spearhead of the Allied advance into the Hindenburg line and on to the recapture of Mons—these are episodes graven on Canada's tables of stone. Nor do Canadians flatter themselves into believing that they suffered what the people of the Mother Country suffered. But they did what they could; and the penalty they paid was not light.

Since the Great War, Canada has gone, like most of the other combatant countries, through a difficult period of readjustment. Even yet she has not solved completely or satisfactorily the problem of the civil re-establishment of those who went overseas, and especially of those who were wounded or otherwise disabled in the Great War. The reorganization of Canadian industry to meet post-war conditions has been, in Canada as in other countries, a long and tedious process. But Canada, fortunately for herself, is a land of vast natural wealth. Her fertile soil, her mines, her forests, her fisheries have enabled her to recover from the war more quickly than any other country engaged in the war, with perhaps the solitary exception of the United States. Details of the process which have brought about this result will be found in special articles in this volume, devoted to special phases of Canada's development in recent years.

Since the dawn of the twentieth century, there has taken place also a striking development in Canadian autonomy. It was during the South African War, which took place at the turn of the century, that the last British troops were withdrawn from Canada, and that the fortifications even of the British coaling-stations at Halifax

and Esquimault were handed over to the Canadian militia. Shortly afterwards, the Canadian militia ceased even to be commanded by an Imperial general officer, as had been the case hitherto. In 1910 Canada embarked on the policy of building up a Canadian navy, under the control of the Canadian government. During the first decade of the twentieth century, Canada thus assumed responsibility for her own defence, internal and external, military and naval. Since then she has asserted her right to sign imperial treaties which affect her, or to refuse to sign them, as well as to make commercial treaties on her own account. She has asserted and obtained the recognition of her right to separate representation in the League of Nations; and she has established a diplomatic service of her own in Washington, in Paris, and in Tokio.

These developments do not, however, as is sometimes maintained, portend separation or independence. They are merely an extension of the principle of "responsible government," which was definitely established in Canada over eighty years ago. Canada is still, and will without doubt long remain, a loyal member of the British Empire or Commonwealth of Nations. If the ties that bind her to the Mother Country are no longer the iron links of law, but the silken bonds of custom and sentiment, there lies in that fact perhaps the surest guarantee of the permanence of the imperial connection. It is not without significance that the period which has seen the greatest development of Canadian autonomy has seen also the adoption and extension of the principle of "imperial preference" in trade, and the establishment of "imperial penny postage". Loyalty to the Crown is, moreover, just as strong in Canada as it every was; and it is a curious fact that the growth of autonomy in the British dominions has actually enhanced the prestige of the Crown, since the Crown of Great Britain has now become the symbol of imperial unity.

THE GEOLOGY OF CANADA

By A. P. Coleman, M.A., Ph.D., F.R.S.

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CANADA is geologically one of the oldest countries in the world, and more than half of it consists of Precambrian rocks, which, so far as is known, have been above the sea ever since the beginning of the Palaeozoic. The "Canadian Shield" formed the vast nucleus about which the North American continent has been built up from that time to the present, and the later rocks have been deposited, layer after layer, in the shallow seas around its margins. The Precambrian of Canada is not symmetrically placed, however, since the western side of the country consists almost wholly of later rocks, while the great peninsula of Labrador on the east belongs wholly to the unfossiliferous Archaean series.

In an outline like the present only the more prominent points can be mentioned, and only brief references can be made to the main subdivisions of the geology as displayed in the more populous southern part of the country.

The Canadian Precambrian Shield consists very largely of Laurentian granite and gneiss, eruptive rocks which came up through older sedimentary materials (Grenville) now changed to marble and quartzite and gneiss, or through great beds of lava (Keewatin). These areas of ancient crystalline rocks in the beginning formed ranges of mountains, which seem to have covered most of the Shield, but which were worn down in the lapse of ages to a peneplain, now displaying only rounded hills and shallow valleys. Rocks of this age form the rugged north shore of the St. Lawrence below Quebec, the picturesque Thousand Islands, and the rocky country near Ottawa and on the east and north of Georgian Bay and Lake Superior. These most ancient formations are somewhat

barren of useful minerals, and very little mining has been done upon their deposits. On this early floor Timiskaming sediments were laid down and penetrated by a later granite (Algoman) which brought with it gold in northern Ontario at Porcupine and Kirkland Lake. Still later, a Huronian ice age, the earliest known in the world's history, deposited the Cobalt conglomerate noted for its silver ores. Finally, in the Keweenawan, the latest part of the Precambrian, there were eruptions of basic rock, such as norite, bringing with them nickel, copper, lead, and zinc in the Sudbury region.

The later divisions of the Precambrian just mentioned cover much less space than the early barren granite and gneiss. The Keweenawan sandstones, shales and great sheets of diabase give rise to picturesque table-topped hills and low mountains north of Lake Superior especially near Thunder Bay. Dipping southwestward from the ancient Shield in southern Quebec and Ontario there are Palaeozoic sandstones, limestones, and shales of Ordovician, Silurian, and Devonian age, laid down in a shallow sea and often containing trilobites, brachiopods, and other fossils. They are to be seen on the flanks of Mount Royal, along Lake Ontario, and especially at Niagara, where the cliffs of the Gorge display splendid sections.

The Carboniferous and Permian of the later Palaeozoic cover much of the Maritime provinces, and may be studied at Sydney or the Joggins in Nova Scotia and near the Bay of Fundy in New Brunswick. Except for some marine beds of the Carboniferous in the Rocky Mountain region, no other part of Canada includes rocks of this important coal-bearing age.

The Mesozoic covers far more space than the Palaeozoic and makes up almost the whole of the great plains southwest of the Precambrian nucleus of the continent. The latest division of the Mesozoic, the Cretaceous, is of chief importance, and its flat-lying sediments underlie most of the typical prairie region of the west, affording excellent soil and containing large deposits of lignite coal of varying quality. Most of the Cretaceous beds are of land or fresh water origin, and at some points they

include great numbers of dinosaur remains. Good examples of skeletons of these huge reptiles may be seen in the Victoria Museum of the Geological Survey at Ottawa and at the Royal Ontario Museum in Toronto.

After the Cretaceous beds were formed at or near sea level, the Rocky Mountains were elevated, and 20,000 feet or more of sediments were thrown into great folds or split into long blocks which were tilted and driven upon one another, forming the bare cliffs which give the name to the chain and which rise so suddenly and impressively from the monotony of the prairie.

The Rocky Mountains proper have a width of about sixty miles and reach heights of 8,000 to 10,000 feet in most places, with a few peaks above 12,000, culminating in Mount Robson at 12,972 feet. In the central and western parts there are many glaciers, and midway between the Canadian Pacific and Canadian National Railways the Columbia ice field covers 110 square miles. From it glaciers reach down into the valleys feeding rivers which flow to the Gulf of Mexico, the Arctic Ocean, and the Pacific.

West of the Rockies are the Selkirks and Gold Ranges, older and not quite as high, but snowier because nearer the Pacific, the source of moisture. Then follows the interior tableland of British Columbia, cut by profound valleys and canyons and containing beautiful lakes. This part is semi-arid, and requires irrigation for the fruit orchards toward the south.

Finally comes the Coast Range of Mountains, formed in Jurassic times by the upwelling of molten rock, much like the Laurentian of eastern Canada. Parts of the older rocks which it hoisted up form "roof pendants", which have been greatly metamorphosed and often contain important ore deposits. The highest mountains in Canada south of the Yukon territory have recently been discovered in the Coast Range, including Mount Waddington which reaches 13,260 feet. Far to the north, Mount Logan attains 19,850 feet, the highest point in Canada, and is surrounded by other lofty peaks in a tableland of

snow and ice covering thousands of square miles and reaching the wild coast of Alaska to the south.

The three mountain chains just mentioned form the Cordillera and make up most of British Columbia; but still farther to the west rises another discontinuous range in the great island of Vancouver and the smaller Queen Charlotte Islands, a chain now half submerged.

Toward the west in the interior plateau and in parts of the mountains along the Pacific, there are lava fields and comparatively modern volcanoes, such as Mount Garibaldi, north of Vancouver, but no eruption has been known in historic times, though in Alaska to the north there are several active volcanoes. The most recent of the mountain ranges, the Rockies, contains no eruptive rocks, unlike the chains to the west, which are largely eruptive.

Thus far the bed-rock geology of Canada has been outlined, and the fact has been noted that its eastern half consists chiefly of the most ancient of known rocks. But Canada is not only the oldest, but also the youngest country in the world, since its present surface, its lakes and rivers and its scenery, have been profoundly modified and impressed by events in the latest part of geological time, the Pleistocene. Nearly the whole of the country has been covered with ice sheets within the last million years, and this has happened more than once, with the result that a very ancient land surface, which must have been buried under the débris caused by weathering during the ages, has been completely renovated. Three vast ice sheets accomplished the work, a Cordilleran sheet which covered British Columbia and reached the islands along the coast, a Keewatin sheet which blotted out the whole of the great plains, and a Labrador sheet which covered all of the east except one or two fringing mountain ranges. Almost everywhere in Canada the effects of these tremendous machines are in evidence. In the north the bare rocky hills show the scouring, polishing, and striations made by advancing ice; while toward the south there are gently undulating stretches of boulder clay making excellent farms; or in places the tumbled hills

and kettle-shaped valleys of moraines where the ice sheet halted, perhaps for thousands of years, dumping the débris borne from the north hundreds of miles from its source.

To the traveller the granites and gneisses scattered here and there as erratic blocks in the field give striking evidence of ice work. From the windows of the train as one crosses the prairie one may see pink granites or green schists from the central Archaean region distributed by the Keewatin ice sheet for hundreds of miles over the Cretaceous beds of the plains. They may be found along Bow River at Calgary within sight of the Rockies, and west of Edmonton on the way to the Athabaska Pass.

In Ontario the work of the ice has been of tremendous importance, since the Great Lakes are largely due to the irregular dumping of moraines, blocking an ancient river valley which drained the region to the Atlantic. Not alone lakes but waterfalls, such as the Sault Ste. Marie between Lake Superior and Lake Huron, Niagara Falls between Erie and Ontario, and the rapids of the St. Lawrence between Ontario and sea level, resulted from the unequal distribution of drift.

A glance at the map of Canada shows innumerable lakes of all sizes and shapes, far more than in any other country. Many of them are crowded with islands, as in Georgian Bay and Lake of the Woods, where there are thousands. They are evidently tracts of hilly country flooded by the blocking of old river channels. The larger lakes, however, sometimes have depths hundreds of feet below sea level, so that they can never be drained, indicating important warpings and changes of level since they belonged to a continuous river valley: but the chief factor in their formation was the barriers of boulder clay and moraine left by the ice invasions.

The value of Canadian lakes and waterfalls, for communication and for electric power, has been very great, particularly in Ontario; and it is not too much to say that these gifts of the ice age have determined the fate of Canada as a separate country from the great nation to

the south. The St. Lawrence and the Great Lakes were the highway of the early French fur trade, which paradoxically made Canada British instead of American in the long run, and the lakes have existed only since the ice left the region.

The geological factors of main importance for the development of Canada have been the Precambrian Shield with its ores of metals stored away a billion years ago; the flat Cretaceous beds with their immense supplies of coal and lignite making the prairie; and the rejuvenating work of the great ice sheets providing rich soil, easily harnessed water powers, and a great chain of lakes for inland communication. Some idea of these geological features can be gathered even from the windows of a train speeding across the continent.

THE DINOSAURS OF ALBERTA

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LIFE on the earth has passed through many stages between its appearance in the far past and its present-day expression. Great races arose, flourished, and disappeared, leaving their remains in the rocks as evidence of their existence. Almost any group of animals or plants furnishes a fascinating history, but perhaps the most spectacular is the great division of the reptiles known as *dinosaurs*. These creatures, remarkable for their size, strength, and bizarre proportions, dominated the earth for about 150,000,000 years—from the beginning of the Mesozoic era to its close, 50,000,000 years ago.

Towards the end of the Mesozoic era, in the Cretaceous period, the dinosaurs had attained their maximum development in both number and variety. At that time western Canada presented an appearance very different from that of to-day. The Rocky Mountains were not yet formed and the warm, moisture-laden Pacific winds reached the interior of the continent inducing a luxuriant vegetation. Further, a great central sea lay over the continent from the Gulf of Mexico to the Arctic Ocean. This sea was shallow and fluctuating; so much so, that its western part became at times brackish or even fresh. In this environment lived the dinosaurs, browsing the abundant vegetation, and probably often wading in the shallow waters off the western shore of the "central sea". Death overtook them and the shifting sands covered their remains preserving the bones, and in some cases, the tough skin for the geologists of the present day to excavate.

THE TRACHODONT DINOSAUR
Kretosaurus incurvimanus
As mounted in the Royal Ontario Museum, Toronto

It so happens that the Red Deer River cuts through the region that was most suitable for the existence of these creatures. In its course of 300 miles from the mountains to its confluence with the South Saskatchewan, this stream has cut a valley 400 feet deep through the strata that accumulated in the ancient sea. The formations revealed by this valley are as follows:

GEOLOGICAL FORMATIONS ON THE RED DEER RIVER, ALBERTA

Age	*Formation*	*Rocks*
Paleocene	Paskapoo	Freshwater sandstone and shales.
Upper Cretaceous	Edmonton	Brackish-water sandstones and shales with coal. Dinosaurs.
	Bearpaw	Marine shales. No dinosaurs.
	Belly River	Brackish-water sandstones and shales with coal. Dinosaurs.

At two distinct times, coincident with brackish water and the formation of beds of coal, dinosaurs flourished in numbers so great that the valley of the Red Deer River has become a classic locality for all students of vertebrate palaeontology. The most prolific region in the upper formation (Edmonton) extends along the river from below Drumheller to about 25 miles above that town. The lower formation (Belly River) yields remains most abundantly from the mouth of Berry creek to a point 15 miles farther down the valley.

Dinosaur remains were first observed in the Canadian North West by Dr. George M. Dawson in 1882, and were first reported from the Red Deer River by Mr. J. B. Tyrrell in 1887. The first serious collecting was done by the Geological Survey of Canada in 1897 and 1898. Almost every summer since that date has seen a dinosaur-hunting expedition in the Red Deer valley. The more important institutions that have prosecuted the search are: Geological Survey of Canada, American Museum

of Natural History, University of Toronto, University of Alberta, and the Field Museum, Chicago. In addition, much material has been collected by private individuals and sold to museums abroad, with the result that the Red Deer River has become famous in the annals of palæontology. The finest collection is that in the American Museum of Natural History, New York; the collection of the Geological Survey of Canada, in the National Museum, Ottawa, and that of the University of Toronto, in the Royal Ontario Museum, Toronto, probably rank in second place.

Modern investigation seems to indicate that the animals hitherto classified together as dinosaurs belong really to two distinct lines of descent. Authorities recognize the *Saurischia* and the *Ornithischia*, the former including the giant reptile-footed forms and the carnivorous types and the latter the beaked forms with predentary bones in front of the teeth. Within the two orders the variations are so great that the classification is extremely complicated.

An outline of the classification, in so far as Alberta is concerned, is as follows:

Saurischia
- Dinodontidae
- Ornithomimidae

Ornithischia
- Ornithopoda
  - Trachodontidae
- Thyreophora
  - Ceratopsidae
  - Stegosauridae
  - Acanthopholidae

The *Dinodontidae* are the great carnivorous dinosaurs. *Gorgosaurus libratus* is the best known example. The type specimen is in the museum at Ottawa, but several others have been found. *Albertosaurus* is another genus represented by specimens in the larger museums.

The *Ornithomimidae* are slender, bird-like, edentulous forms of which many partial skeletons have been found. Owing to the extreme delicacy of the bones few heads have

been preserved; the best is in the museum at Toronto (*Struthiomimus samueli*).

The *Trachodontidae* or "duck-billed dinosaurs" are the most abundant in both formations. They may be divided into two groups depending on the presence or absence of a crest on the head. The crested forms are represented by *Corythosaurus*, *Prosaurolophus*, *Lambeosaurus*, and *Parasaurolophus*. The first three genera are represented in all the larger museums. The only skeleton of *Parasaurolophus* is in the museum at Toronto. Uncrested trachodonts are represented by *Thespesius*, *Kritosaurus*, *Edmontosaurus* and several other genera. Many complete skeletons have been mounted in the greater museums.

The *Ceratopsidae* or "horned dinosaurs" are abundant. These forms have great horns on the head and a frill of bone extending back as a protection for the neck. The evolution of the race is admirably illustrated by the progressive series obtained in Alberta. Important genera are *Ceratops*, *Centrosaurus*, *Styracosaurus*, and *Chasmosaurus* from the Belly River formation, and *Arrhinoceratops*, *Anchiceratops*, and *Leptoceratops* from the Edmonton. Many skeletons and heads have been mounted in the three museums mentioned.

The *Stegosauridae* are a peculiar group of dinosaurs represented in Alberta by Troödon, of which a very perfect head is in the museum at Edmonton. *Thescelosaurus*, represented by a fine skeleton in the Toronto museum, is probably to be ascribed to this group.

The *Acanthopholidae* are the most remarkable of all dinosaurs. They are huge, low-set animals with a coarse integument in which are set bony plates as defensive armour, hence the name "plated dinosaurs". The head, also, is covered with dermal plates. Characteristic genera from Alberta are *Euoplocepahus*, *Panoplosaurus*, *Dyoplosaurus*, and *Anodontosaurus*.

The valley of the Red Deer River is a veritable scientific treasure-house. The study of the fauna has added much to our knowledge of the past, and has solved some problems in the doctrine of evolution. Further exploration will reveal more treasures and furnish other con-

necting links in the chain of life. It is the duty of the country to see that these priceless monuments of the past are not destroyed, as they must be, if not collected as soon as exposed by the wearing-away of the rocks. The process of decay is constantly at work, and specimens are constantly being revealed. Once exposed, the bones rapidly disintegrate and the specimen is lost forever.

THE MINERAL WEALTH OF CANADA

By Charles Camsell, B.Sc., LL.D.

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THE mineral industry of Canada has so great a part of the national thought that it is impossible to form a conception of the Dominion apart from it. Huge business undertakings such as International Nickel have captured the popular imagination to such an extent that, though the mining industry ranks third in value of production among the basic industries of Canada, it leads all others in point of interest to the citizens at large. The more outstanding advances in aviation in Canada have been made in connection with the opening up of wide expanses of barely explored territory that constitute the greater part of the Canadian Shield—an enormous body of Precambrian rocks that already, though only a comparatively small portion has been so far developed, is supplying more than 60 per cent. of Canada's metallic minerals and 35 per cent. of her total mineral output. Under the stimulus of readily available capital, and facilitated by the use of aerial transport, the search for minerals and the development of known deposits are making such strides as greatly to enhance Canada's position among the mineral-producing countries of the world. Large areas of mining territories in the north are commanding the interest of exploration companies, who, aided by fleets of powerful aeroplanes, are conducting intensive prospecting operations; meanwhile great bodies of ore that have been already "proved up" are being rushed to the stage of production.

The rapid increase in Canada's mineral wealth is manifest in the fact that in 1929, for the fourth year in succession, a new high record of output was reached, the total value of production being nearly $304,000,000. This is an advance of $29,000,000 over the output value of

1928 and of $78,000,000 over the figure for 1925. Metallic and non-metallic values continue about equal, mainly owing to the production of coal and structural materials to the value of nearly $120,000,000. The rate of increase in production is, however, faster in the case of the metals, and it is to these rather than to the more commonplace non-metallics that Canada's prestige as a mining country is due. She is now producing 90 per cent. of the world's nickel; 85 per cent. of the world's asbestos; 55 per cent. of the world's cobalt; 9 per cent. of the world's gold; 8.7 per cent. of the world's lead; 6.4 per cent. of the world's zinc; and 4 per cent. of the world's copper.

Production figures alone, however, cannot convey a true impression of the extent of Canada's mineral wealth, except to indicate the potentialities in her vast unprospected areas, by showing what has been found already in a relatively small part of the country. In the two great geologic regions that are the chief sources of the metals, the Canadian Shield and the Cordilleran region, large areas are yet entirely unprospected and in some cases unexplored. The Canadian Shield is a huge area of Precambrian rocks embracing more than half the land area of the Dominion from the Great Lakes to the Arctic Archipelago: within it lie 95 per cent. of Quebec, 80 per cent. of Ontario, three quarters of Manitoba, one-half of Saskatchewan, a small portion of Alberta, and a large slice of the North West Territories. The Cordilleran region embraces the great mountain ranges of the Pacific coast and includes British Columbia, the Yukon, and part of Alberta.

A wide variety of minerals are mined within the Shield. Among the metallics are gold, nickel, copper, silver, lead, arsenic, and zinc. In association with the nickel-copper ores occur the precious metals of the platinum group. The most important mining region is in Ontario between Cochrane in the north and the coast of the Georgian Bay of Lake Huron. Concentrated in this small area are metallic ore bodies which account for over three-quarters of the present mineral output of the Pre-

cambrian. Here are situated the Porcupine and Kirkland Lake gold camps, and the silver camps of Cobalt, South Lorrain, and Gowganda. Not far distant are the rich Sudbury nickel-copper ores and in adjacent Quebec territory the copper-gold ores of Rouyn, now being treated in a modern smelter at Noranda.

Of the newer mining areas in the Shield the more outstanding are those in which are situated the Flin Flon and Sherritt-Gordon mines near the Manitoba-Saskatchewan boundary. In these districts are large bodies of copper-zinc ore, the complex nature of which was a problem to metallurgists for many years. Now, however, a satisfactory process of treating them has been evolved and production is expected within the next year. A promising lead-zinc-copper area is being developed in the Chelmsford district near Sudbury, Ontario, while new gold fields are being developed in the Patricia district of Ontario and in the region southeast of Lake Winnipeg in Manitoba.

The Cordilleran region, like the Canadian Shield, is pre-eminently noted for its metal mines. From within its confines come more than 30 per cent. of the present metallic output of Canada, including 99 per cent. of the lead, nearly 90 per cent. of the zinc, 60 per cent. of the silver, over half the copper, and 12 per cent. of the gold. A great series of altered sediments of Precambrian and later age, intruded by granites, is prominent in southern British Columbia, where lie the auriferous copper ores of Copper Mountain and the argentiferous lead-zinc ores of the Kootenays. Another great mineralized formation is situated along the borders of the granitic batholiths that form the major structure of the Coast Range, from the rich copper, gold, and silver ores of which come more than half the metal production of British Columbia. In the Mayo district of Yukon lie extensive silver-lead deposits. Gold is obtained from both placer and lode sources, the bulk of the lode gold being obtained from the ores of Portland Canal district.

Between the two outstanding metal-producing divisions of Canada are the interior plains, underlain by a great

thickness of sedimentary rocks. Within these sediments lie nine-tenths of Canada's extensive coal reserves, of all grades from lignite to semi-anthracite, together with petroleum, natural gas, and structural materials. The now famous Turner Valley gas and oil field of southern Alberta, from which comes 66 per cent. of Canada's oil output, is here, and also, far to the north, McMurray with its millions of tons of oil-impregnated bituminous sands.

Geological conditions similar to those in the interior plains exist in southeastern Canada, where the St. Lawrence Lowlands extend from the Ontario peninsula, between Lakes Huron, Erie, and Ontario, to beyond the city of Quebec. This also is a non-metallic area producing salt, gypsum, natural gas, and petroleum, together with an abundance of structural materials. Until 1909 the Ontario peninsula was the sole source of Canada's output of petroleum, and, though now overshadowed by the western fields, it is still an important factor therein. The natural gas field, with a record of thirty years steady production, still has over a thousand active wells.

Further to the east, in the Appalachian region, are the famous chrysotile deposits of southern Quebec that supply 85 per cent. of the world's asbestos; the gold-bearing rocks of Nova Scotia; rich deposits of bituminous coal; and extensive beds of fine commercial gypsum.

In order of total values, the leading minerals of Canada are coal, copper, gold, nickel, cement, lead, asbestos, clay products, silver, and zinc. The output value of each of these products exceeds ten million dollars annually.

Of the coal produced in Canada, amounting in 1929 to 17,500,000 short tons valued at $63,000,000, four-fifths was bituminous, the balance being principally lignite. About half the bituminous coal was mined in the Maritime provinces, the rest being supplied by Alberta and British Columbia. About one-sixth of all the coal mined in Canada is produced in the Cordilleran on Vancouver Island and in the Crow's Nest basin of the Rocky Mountains. Canada's coal situation is paradoxical;

credited with a substantial percentage of the world's resources—sufficient to supply her entire domestic needs with an exportable surplus—she imports half the fuel she uses. This position is due to the distance separating her deposits from the centres of consumption in Ontario and Quebec. Great strides towards fuel independence are, however, being made, and considerable research work is under way in connection with the conversion of solid into liquid fuels, carbonization of low-grade coals, and the recovery of valuable coal-tar by-products. Recently the Ontario government investigated large lignite deposits on Abitibi River in the area to the south of James Bay. Diamond-drilling operations have revealed deposits estimated to contain between twenty and thirty million tons of available low-grade coal. The field explored covers an area of two or three square miles, the deposits having an average thickness of twenty feet.

The value of the 1929 copper production, $43,362,000, was 50 per cent. more than that of 1928, making copper Canada's chief metal. Of this output, 43 per cent. came from British Columbia, 34.5 from the nickel-copper ores of Sudbury, Ontario, and 22.5 from Quebec. Workable copper deposits of considerable size occur at many points in Canada and a number of new ones have recently come into development. Of the latter, the most outstanding are the Frood nickel-copper mine at Sudbury and the Flin-Flon and Sherritt-Gordon copper-zinc mines in northern Manitoba. In the Frood the copper content of the ore is sufficient to make it a great copper mine, if it were not already a great nickel mine. The ores in all these mines carry profitable amounts of the precious metals. The Chibougamau field in Quebec, discovered in 1929, is one of the most promising of the newer camps. The fact that it was opened up through the medium of aeroplane prospecting gives it something of the interest attaching to pioneering days, while its comparative accessibility will make for rapid development once satisfactory ore bodies are proved. The mineralization is in the form of sulphides, with values in copper and gold. A gratifying feature of Canada's copper industry is the

large scale on which refining is about to be undertaken. An electrolytic copper refinery with an initial capacity of 120,000 tons of finished metal a year is now nearing completion at Copper Cliff, near Sudbury, and two others are said to be contemplated, one in Eastern Canada and one possibly on the Pacific coast.

Gold is of widespread occurrence in Canada and is obtained from three general sources: alluvial deposits, quartz lodes, and base-metal ores carrying gold values. At the present time gold-quartz mines of Porcupine and Kirkland Lake furnish about 85 per cent. of the annual production, which in 1929 had a value of $39,585,000. The 12 or 13 per cent. recovered from base-metal ores comes chiefly from British Columbia and from Rouyn, Quebec. Other sources are the nickel-copper mines of Ontario and the base-metal mines of British Columbia, Yukon, and Quebec. The prospects for an increase in Canada's gold output are of the best, particularly from auriferous base-metal mines, both by the expansion of present operations and by bringing new mines into production.

It is as a producer of nickel that Canada is best known in the world's metal markets. The known reserves of workable nickel-copper ores in the Sudbury district are very large and there are possibilities of further discoveries being made. These ores are remarkable in that they contain not only nickel and copper but also appreciable amounts of gold, silver, platinum, palladium, and the still rarer metals osmium, iridium, rhodium, and ruthenium, all of which are recovered in refining. Nickel is coming to be recognized as essential in many lines of industry. It is pre-eminently a metal for alloy, its anti-corrosive properties and magnetic permeability giving it an almost limitless variety of uses.

The chief source of Canada's lead and zinc is British Columbia, most of the output of which is in the form of electrolytically refined metal largely obtained from the ores of the Sullivan mine—probably the largest known deposit of its kind in the world. Production of both lead and zinc in Canada is increasing rapidly. The

output of the Sullivan has been stepped up from 4,000 to 6,000 tons a day; the big zinc-copper mines of Manitoba will soon be producing; extensive zinc-lead-copper deposits are under development in Ontario; and the Stirling mine in Nova Scotia expects to produce lead, zinc, and copper concentrates in the immediate future. Some ores in the Rouyn district of Quebec also contain zinc in appreciable quantities.

Silver is now produced in Canada chiefly as a by-product from the treatment of complex ores at Trail, B. C., principally from the Sullivan mine, which, with its output of five million ounces annually, is the largest individual silver producer in the British Empire. Among the ores won primarily for their silver content are the silver-cobalt ores of Ontario and the silver-lead ores of the Yukon. The former are, however, being gradually exhausted, and the future production of silver in Canada appears to depend largely upon that of the base metals with which it is associated.

Asbestos, like nickel, has long been a product of national importance in Canada. In the Eastern Townships of Quebec lie the well-known asbestos deposits of Thetford Mines and vicinity, and the mines there supply 85 per cent. of the world's consumption. The advent of Rhodesia into the field as a large producer, however, has had the effect of making world markets for long fibre asbestos competitive and largely a matter of production and transportation costs. On the other hand, in the greater volume of asbestos products short fibres are chiefly used; new uses are constantly being found, while uses already known are being widened, and the largest consumer of Canadian asbestos, the United States, is near at hand, so that the Canadian asbestos industry is in little real danger.

On the whole, there is every reason for the greatest optimism in regard to Canada's mineral industries, particularly in the metallics. The scope of her resources is tremendous. New and important reserves of ores are being blocked out. New areas are being brought within the purview of prospectors; and newer and more efficient methods of ore-treatment are being developed. Abund-

ant water-power lies awaiting the harness of industry, a factor that can hardly be over-estimated. With the gradual exhaustion of Old World resources at a period when the world's need for minerals is increasing with almost astonishing rapidity, Canada assumes a position of singular strength, and it is inevitable that the demands for her products will become greater, more varied, and more insistent.

WATER-POWER RESOURCES AND ELECTRICAL DEVELOPMENT

By C. A. Magrath, LL.D.

Chairman of the Hydro-Electric Power Commission of Ontario

TO a remarkable degree the economic and social life of Canada is favourably influenced by an abundant supply of electrical energy developed from its water-powers. The development of hydro-electric power in the last decade has made notable progress, largely because the present-day industrial leader appreciates the fact that the more mechanical power he can place at the service of his employees, the greater will be his output. The result of such a policy is to improve the earning capacity of the worker—which should be to his advantage—and at the same time greatly to increase the production of wealth in the country. Electrical energy is an essential factor in Canadian industrial development and most of the provinces of the Dominion have substantial reserves of power which are progressively being developed. These resources of power, made available at attractive rates, are a great stimulus not only to industrial progress, but also to the general development of the country. There has been steady growth in the use of electricity in the homes of the people, and more recently extensive electrical service to rural districts has substantially raised the standard of living for this important section of the population.

Extent and Distribution

The water-powers of Canada are well distributed through the Dominion. An exception is found in the southern portion of the prairies, extending from western Manitoba to the foothills of the Rockies in Alberta. This area, however, is well situated with respect to

coal supplies. It is an important fact that accessible water-powers are most abundant in those areas—particularly of Ontario and Quebec—where native coal is not conveniently available.

As in the case of other natural resources, such as forests and minerals, the water-power resources of the Dominion are not yet fully known. The first comprehensive reconnaissance survey of the water-power situation was made by the Federal Commission of Conservation in the years 1910-1913, and since that time many additional data relating to these resources have been gathered by the Department of the Interior, Ottawa, as well as by the provincial authorities having jurisdiction in such matters. The latest summary of Canada's hydraulic resources published by the Dominion Water Power and Reclamation Service conservatively estimates the total developable water-power at ordinary minimum flow of the rivers to be about 20,300,000 horsepower. At the flow ordinarily available for six months of the year, the total becomes about 33,600,000 horsepower; based upon installations already made, it is estimated that the known water-powers would permit a turbine installation aggregating about 44,000,000 horsepower. The total installation to date in water wheels and turbines throughout the Dominion is about 6,000,000 horsepower, representing less than 15 per cent, of the estimated possible installation of the "known" resources.

Great Power Rivers

There are several outstanding power rivers in Canada. Chief among these are the Niagara and the St. Lawrence, and a close third is the Nelson River in Northern Manitoba. The Niagara River is the greatest water-power stream in the world, and furthermore its value is immensely enhanced by its proximity to densely populated areas both in the United States and in Canada.

The power expended by the Niagara River in its descent of 326 feet from Lake Erie to Lake Ontario amounts to nearly 8,000,000 horsepower. Considerations of its character as an international boundary river, its scenic

beauty and certain other reasons have influenced the countries concerned to authorize a diversion for power smaller in amount than the whole flow. At present, the permissible diversion is governed by treaty, and is limited to a total of 56,000 cubic feet per second, or about one-quarter the average Niagara flow of 210,000 cubic feet per second.

The St. Lawrence River has a total potential power of about 5,000,000 horsepower. Of this 2,000,000 horsepower is on the international portion extending from Lake Ontario to just below the town of Cornwall, and is shared equally by the province of Ontario and the state of New York. The remaining 3,000,000 horsepower is in the province of Quebec.

The flow of the Niagara and the St. Lawrence Rivers is exceptionally uniform, due to the balancing effect of the Great Lakes—the greatest fresh-water system in the world.

A Brief Survey From Coast to Coast

Eastern Provinces. The provinces of Prince Edward Island, Nova Scotia, and New Brunswick have ample and well-distributed precipitation, and their inland waters are sufficient for domestic, municipal, and agricultural purposes. Prince Edward Island, on account of its small size and the characteristics of its topography, possesses comparatively little water-power. Nova Scotia is well endowed with water power, and on many of its streams there are exceptional facilities for storage. New Brunswick also has many water-powers of economic importance. On the St. John River at Grand Falls is the largest water-power in the three provinces. It is now developed with a present installed capacity of 60,000 horsepower. Data respecting provincial water-power resources and developments are given in the table on page 52.

Quebec. Coming, next, to the province of Quebec, we find that, so far as is known, this province possesses the greatest water-power resources. Of the many large rivers flowing into the St. Lawrence from the northern

Laurentian plateau, three are specially worthy of mention, the St. Maurice, the Saguenay, and the Ottawa,—the last-named being for most of its length an inter-provincial waterway separating Ontario and Quebec.

On the St. Maurice River are four power developments with an aggregate installed capacity of 576,000 horsepower. The flow of the river is largely controlled by means of great storage works undertaken by the government of the province of Quebec through the Quebec Streams Commission. In the field of essentially artificial reservoirs, the Gouin dam and reservoir is only exceeded in storage capacity by the Gatun lake on the Panama canal. The Quebec Streams Commission has also constructed other storage works which have been of great benefit to the users of the streams affected.

The development of the Saguenay River has created an important industrial settlement. On the Grande Décharge from Lake St. John at Isle Maligne there has been constructed a water-power development having an installation of 495,000 horsepower, and at Chute-à-Caron there is under construction a development of 800,000 horsepower. These immense developments are for the supply of power chiefly for great basic industries, such as the production of aluminium and the manufacture of pulp and paper.

The city of Montreal and district is supplied with power from a 197,400 horsepower development at Cedars rapid on the St. Lawrence River and other smaller developments. Large blocks of power are also received from the developments on the St. Maurice River.

On the main stream of the Ottawa River, development has been practically confined to the vicinity of Ottawa, where about 100,000 horsepower is developed. At other sites on the river there is available, however, with controlled flow, about 1,000,000 horsepower to be shared by Ontario and Quebec. Developments on the headwater tributaries of the Ottawa River supply power to the mining districts of northern Ontario.

An interesting recent development in Quebec is that on the Gatineau River, an important tributary to the

NIAGARA FALLS FROM THE AIR

By Courtesy of the Royal Canadian Air Force

GREAT FALLS POWER STATION AND DAM, WINNIPEG RIVER

Ottawa, which within the space of a few years has been almost completely developed by the concentration at three large power houses and dams of the total head of the lower reaches of the river. In the upper reaches large storage reservoirs have been constructed which will afford regulation of the flow of the river. The present installation of the three power developments is 436,000 horsepower. The Ontario Hydro-Electric Power Commission has contracted for 360,000 horsepower from these developments for use by the municipalities of Ontario.

Ontario. The province of Ontario ranks second of the provinces in the amount of water-power available, as well as in the amount developed. The chief powers are on the Niagara, St. Lawrence, and Ottawa Rivers, but other important powers are found on the rivers draining into the Great Lakes, particularly Lakes Huron and Superior, and on the streams which drain the northern slopes of the Laurentian plateau to James Bay and Hudson Bay. The growth of the mining industry is giving to these northern water powers an increased importance. In the western portion of the province, the Winnipeg and English Rivers contain several valuable powers.

In the province of Ontario has been developed the largest publicly owned electrical undertaking in the world. It is a co-operative municipal-ownership enterprise, province-wide in its field, and administered by an independent commission known as the Hydro-Electric Power Commission of Ontario. The Commission has now been actually supplying electrical energy since the year 1910. At the present time, the undertaking, commonly referred to as the "Hydro", serves 608 municipalities, including 26 cities, 87 towns, 229 villages and hamlets, and 266 townships. About 70 per cent. of the population of the province is served, and the capital investment exceeds $300,000,000.

The Commission's sources of power supply for its several systems include the Queenston-Chippawa plant of 550,000-horsepower capacity, which develops on the Niagara River the maximum hydraulic head available

between Lake Erie and Lake Ontario, and two other large developments at Niagara Falls formerly owned by private companies. Power is also obtained from some thirty smaller hydro-electric developments throughout the province, and in addition substantial blocks of power are purchased from privately-owned developments in the province of Quebec. At the present time the Commission is supplying a total of about 1,100,000 horsepower, and has made provision for some 800,000 horsepower to meet immediate future demands.

Electrical energy is distributed wholesale to the partner municipalities by the Commission, and retailed by the local electric utilities to the ultimate consumers *at cost.* Cost, in each case, includes all charges entering into the business of electrical supply, and, in addition to interest on the investment, administration, operating, and maintenance expenses, and the usual renewal and contingencies reserves, includes sinking fund payments, by means of which the municipalities are progressively becoming the owners of a fully paid-up undertaking.

The past few years have witnessed an unprecedented expansion of rural electrical service throughout the province. In 1929, the Commission constructed about 1,150 miles of line in rural power districts, to serve 6,270 new customers, bringing the total lines up to 5,300 miles serving 37,000 rural consumers, including 16,000 individual farms. The capital expenditure, including the provincial government grant-in-aid, now exceeds $11,000,000. The grant-in-aid is of material benefit in making feasible the extension of electrical service in areas that could not otherwise be served.

Although the general supply of electrical energy in Ontario is mainly in the hands of publicly-owned undertakings, there are many important private plants, the bulk of the power thus developed being utilized in the basic industries—chiefly for pulp and paper production. Some 12 per cent. of the total of harnessed water-power in the province is developed by pulp and paper companies for their own use, and 5 per cent. is similarly developed by other large industries, chiefly for mining.

Manitoba. In Manitoba, the Winnipeg River, which flows from the Lake of the Woods on the international boundary to Lake Winnipeg and in earlier days played an important part as a trade route to the West, is now a bountiful source of electrical energy for the city of Winnipeg and vicinity. Under regulation, its flow will yield nearly 500,000 horsepower,— a substantial portion of which is still undeveloped. The Nelson River in Northern Manitoba has already been referred to as one of the great power rivers of the Dominion. Its vast water powers are capable of yielding about 2,500,000 horsepower. Although at present remote from centres of population, it has in part been made accessible by the completion of the Hudson Bay Railway, and development of one of its sites is proposed for the near future to serve the newly-opened-up mining areas of northern Manitoba.

Saskatchewan. The water-powers of Saskatchewan are practically confined to its northern areas, but may prove of substantial value for the development of its mineral and other natural resources.

Alberta. Alberta's water-powers are largely situated in the streams draining the eastern slopes of the Rocky Mountains and at some sites on the large rivers of its northern territory. Alberta, however, is so well supplied with coal areas that its water-power resources are less essential to its general development. Irrigation is extensively practiced in southern Alberta and takes precedence in use of water over power development. There are, however, a few important water power developments, the chief being those on the Bow River and its tributaries supplying power to the city of Calgary, and to an extensive transmission network which in the near future is planned to reach the city of Edmonton.

British Columbia. The water-powers of British Columbia are bountifully distributed throughout the length and breadth of that great province, the dominating physical feature of which is its great mountain ranges. Even its smaller mountain streams frequently form important sources of power due to the extremely high heads that

can be developed. The coastal areas, including Vancouver Island, are especially favoured. Heavy rainfall, storage in glaciers and mountain lakes, and very favourable geological structure for the construction of dams combine for advantageous water-power development on the coast streams.

The chief districts served by extensive transmission systems and water-power developments in British Columbia are the southern end of Vancouver Island, including the city of Victoria; the Fraser River delta, including the city of Vancouver; and the Boundary district of the Interior, including the city of Nelson and the important mining areas adjacent to the international boundary. In all these districts a progressive policy has kept pace with the demands for electrical service from communities growing in population and industrial activity, and this same policy is at the present time inspiring the efforts for the future.

The following recent table compiled by the Dominion Water Power and Reclamation Service presents the available and developed water-power in Canada by provinces.

AVAILABLE AND DEVELOPED WATER-POWER IN CANADA

Province	*Available 24-hour power at 80 per cent efficiency*		*Turbine installation horsepower*
	At ordinary minimum flow horsepower	*At ordinary six months flow horsepower*	
British Columbia	1,931,000	5,103,500	559,792
Alberta	390,000	1,049,500	70,532
Saskatchewan	542,000	1,082,000	35
Manitoba	3,309,000	5,344,500	311,925
Ontario	5,330,000	6,940,000	1,952,055
Quebec	8,459,000	13,064,000	2,595,430
New Brunswick	68,600	169,100	112,631
Nova Scotia	20,800	128,300	109,124
Prince Edward Island	3,000	5,300	2,439
Yukon and Northwest Territories.	294,000	731,000	13,199
Canada	20,347,400	33,617,200	5,727,162

Development and Utilization

In this necessarily brief review only a few salient facts can be given. The total installed capacity of water-power plant in the Dominion is now nearly 6,000,000 horsepower. Of this total some 5,000,000 horsepower or 85 per cent. is installed in central stations. More than 95 per cent. of the total main plant equipment of central stations is in hydraulic generating stations and almost 99 per cent. of the total electrical output is produced from water-power. A substantial proportion of the central station output is sold in large blocks to the pulp and paper industry, for the mining and reduction of minerals, and for electro-chemical production. Including the power directly applied and the electrical power generated or purchased from central stations, about 1,500,000 horsepower is actually used for power purposes in the manufacture of pulp and paper,—an outstanding feature of industrial progress in Canada. An equipment of approximately 100 horsepower is required for each ton of newsprint produced per day. Thus, a mill with a capacity of 500 tons of newsprint per day would require a plant of about 50,000 horsepower.

Generally speaking, no communities are better served with electricity than are the cities, towns, and villages of Canada. The total installation of hydraulic power in the Dominion averages nearly 600 horsepower per 1,000 of the population, a figure which places Canada among the leading nations of the world in the utilization of its water-power resources.

PULP AND PAPER IN CANADA

By the Natural Resources Intelligence Service,
Department of the Interior, Canada

NEXT to agriculture in the annual value of products in Canada stands forestry. This fact is due to the rapid development of the pulp and paper industry, the most important manufacturing industry in the Dominion. This industry has led in the gross and net values of manufactured products and the wages and salaries paid since 1925, even though the operations in the woods are disregarded.

During the last hundred years the paper industry has been revolutionized. Previous to 1860 no wood pulp was used or produced, such materials as rags, straw, and cotton waste being the raw materials for the manufacture of paper. To-day, paper produced from materials other than wood forms but an insignificant part of the whole. In this respect it is interesting to note that to Canada belongs the distinction of having made the first paper from wood fibre.

In the year 1821 there was born, in Sackville, Nova Scotia, a boy destined to discover a new process for the manufacture of paper. Although employed as a farmer and sawyer, this lad, Charles Fennerty by name, found time to haunt the paper mill at Bedford, some few miles from his home. Ever a poet and dreamer, he was seized with the idea that the forests could be made to yield a fibre suitable for producing paper. Accordingly, with the few rude facilities at his disposal, he attacked the problem with quiet perseverance. In 1839 he produced his first paper from spruce, and five years later addressed a letter to Messrs. English and Blackaddar in Halifax, enclosing a sample of his product. In this letter he said, "The enclosed, which is firm in its texture, as white, and to all appearance, as durable as the common

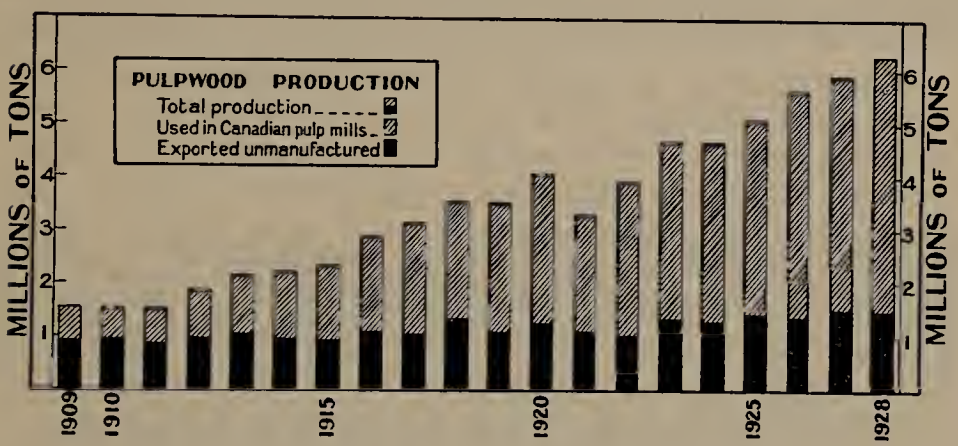
wrapping paper made from hemp, cotton, is actually composed of spruce wood reduced to pulp." Thus was the first wood-pulp paper introduced.

It is believed that Canada's first paper mill was erected at St. Andrews, Quebec, in 1803, and the first wood-pulp mill at Windsor Mills, Quebec, about 1870.

The industry in Canada includes three forms of industrial activity, the operations in the woods, with pulpwood as a product, the manufacture of pulp, and the manufacture of paper.

Due to the proximity of this country—boasting abundant water-power adjacent to extensive pulpwood forests—to the United States of America with its enormous demand for newsprint, the production of pulpwood forged

CHART I



rapidly ahead. In the early days of the industry a large proportion of this wood was exported as logs, but the trend has been toward fabrication before export. This tendency has been fostered by two powerful influences, the development of large amounts of water-power, and legislation compelling the conversion of pulpwood from Crown lands into pulp in Canadian mills. It will be seen from an examination of Chart I that there has been a well-sustained growth in the production of pulpwood since 1909, and a more rapid growth in the amount used in Canadian mills, while the exports of raw pulpwood have increased but little.

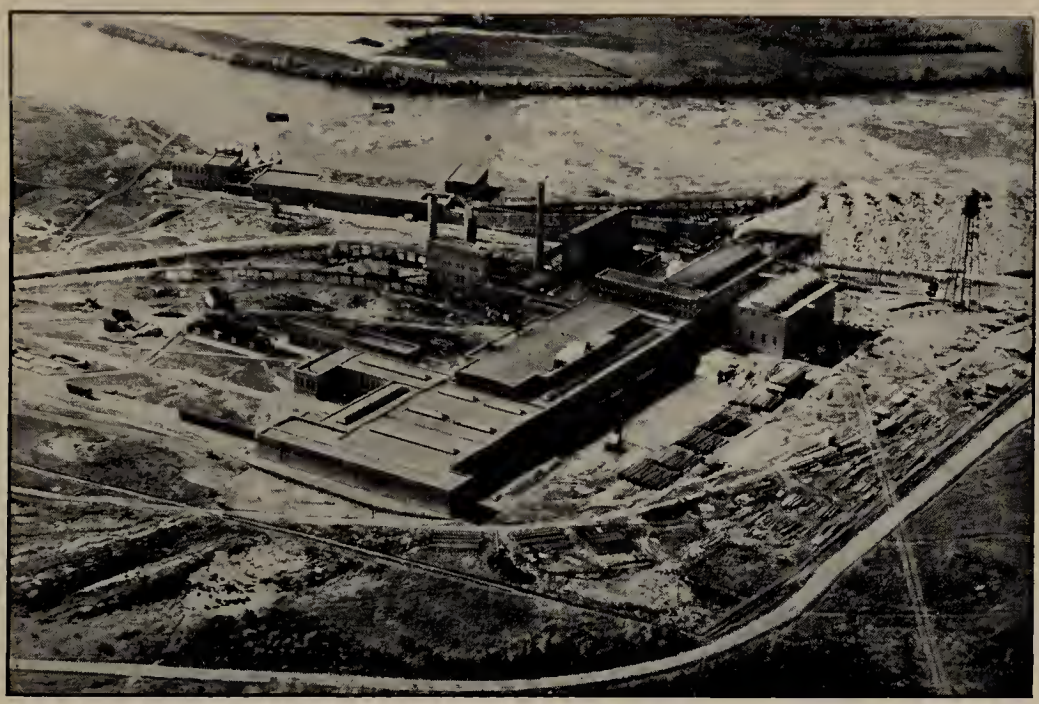
The pulpwood may be delivered to the mills with or without preliminary processing. In cases where the wood is to be delivered at a distance, the bark and unsound material is frequently removed before shipment, and for this purpose there are several "cutting up" or "rossing" mills operating as independent units.

When the pulpwood is delivered at the mill it may be reduced to pulp by either mechanical or chemical means. For the production of mechanical pulp, green coniferous woods are favoured. This wood, having been barked and cut to the required length, is fed to grinders where it is reduced by contact with grindstones of large diameter. The fibres, thus separated, are washed away by a stream of water constantly playing on the stone. The resultant pulp or "groundwood" is only suitable for the cheaper grades of paper and board, as it contains all the constituents of the original wood, many of which are not durable.

Three methods of producing chemical pulp are in use —the soda process, the sulphite process, and the sulphate or kraft process. Of these the soda process is the oldest and the sulphate a comparatively recent innovation. All these have one object in common—the separation of the cellulose fibres from the other constituents, notably fats and resins. Cellulose is the ideal material for paper-making. It is inert, and high-grade papers, being almost pure cellulose, will remain unchanged for centuries.

Before being treated with chemicals, the cleaned pulpwood is machine-chipped, screened, and crushed. The chips are then fed to digesters, mixed with the chemicals in the presence of steam under pressures as high as 125 pounds, and cooked to the required degree. The treated mass is then subjected to washing and screening cycles, and is reduced to the required consistency. The details of treatment are varied according to the use for which the pulp is destined.

The oldest, or soda, process utilizes the solvent action of alkalis on the non-fibrous components. It is used, mixed with a stronger pulp, in the manufacture of well-finished paper, lacking in strength.



PULP AND PAPER MILLS OF PRICE BROS. LTD., AT RIVER BEND
ON THE SAGUENAY RIVER, PROVINCE OF QUEBEC

PAPER MACHINES, POWELL RIVER, B.C.

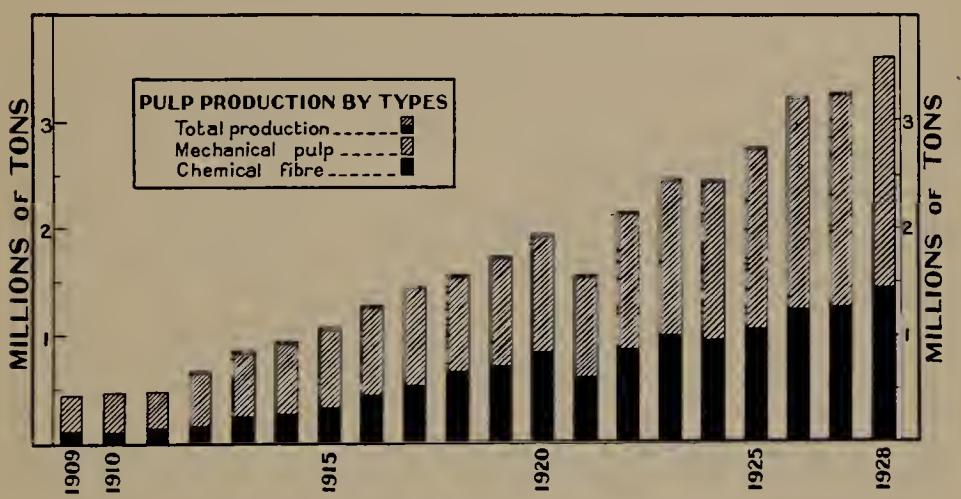
SPANISH RIVER PULP & PAPER CO., SAULT STE. MARIE, POWER HOUSE IN THE CENTRE ON THE ST. MARY'S RIVER AND THE CANADIAN LOCKS IN THE FOREGROUND

SHIPMENT OF PAPER ON THE WHARF, POWELL RIVER, BRITISH COLUMBIA

Sulphite pulp is the most important. A bi-sulphite liquor made from limestone and sulphur dioxide is used, and produces a strong, high-grade pulp. In newsprint a mixture of about 20 per cent. sulphite pulp and 80 per cent. groundwood is used. It is also used alone or mixed with other fibres to make the better grades of white paper and boards.

The so-called sulphate process produces an exceptionally strong fibre of a brownish colour. Sulphide process might be a better name, since the most active constituent of the complex liquor used is sodium sulphide. Because of the great strength of the fibre, it is peculiarly adapted to the manufacture of wrapping papers.

Chart II



The production of groundwood in 1909 was 325,609 tons, and in 1928 had grown to 2,127,699 tons, an increase of 553 per cent. In the same period the output of chemical pulp rose from 119,799 tons to 1,374,196 tons, or 1047 per cent. This is shown graphically in Chart II.

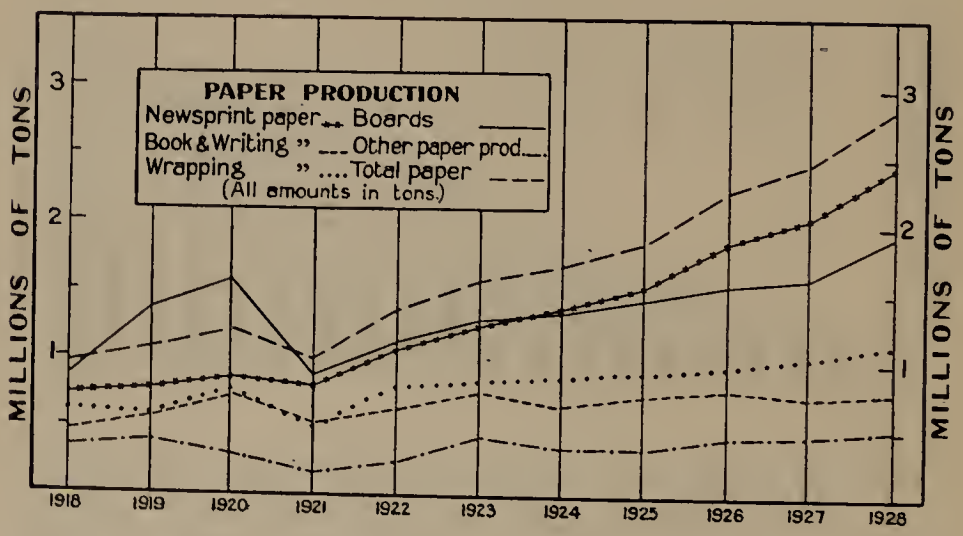
Roughly 25 per cent. of the pulp manufactured is exported. In 1928, of a total export of 863,800 tons, 628,437 tons were chemical fibre. The other 75 per cent. is made into paper, paper boards, etc., in Canadian mills.

The production of paper and paper products has also increased rapidly. The greatest increase is shown by

newsprint, but book and writing paper, wrapping paper, boards, and specialties have registered a healthy growth. The total output of paper in 1918 was 967,724 tons and in 1928 was 2,849,199 tons, and of newsprint only, 734,783 tons and 2,414,393 tons. Chart III shows, in graphic form, the fluctuations in the paper industry from 1918 to 1928.

The gross value of the manufacturing aspect of the pulp and paper industry, exclusive of operations in the woods, was $233,077,236 in 1928. If the sum of the values of pulp and pulpwood exported and the value of paper products made is taken, a total of $245,346,839 results, which may be taken as the value of the industry, including woods operations, but excluding the value of pulp used in the artificial silk and fibreware plants.

CHART III



There were 110 establishments operating in Canada in 1928. Of these 33 made pulp only, 47 were combined pulp and paper mills, and 30 made paper only. The capital invested was $685,687,459, an increase from the previous year of 18.3 per cent., and an investment second only to that in the hydro-electric industry. The 33,614 employees received $47,322,648 in wages and salaries, and the contribution toward a favourable trade balance was $193,673,186.

As has been shown, about 84 per cent. of the Canadian paper production is newsprint, the greatest market for which is the United States. But this does not give an adequate picture of the great importance of the Canadian newsprint industry. Since 1913 Canada has been the world's greatest exporter of newsprint, and in 1927 manufactured almost one-third of the world's supply.

During the early part of 1929 there was much uncertainty as to the outlook, since the capacity of Canadian newsprint mills had increased to a point where many observers predicted disaster. Although the mills worked to only 85 per cent. of their rated capacity, the worst fears of the pessimists were not realized, and the industry is facing the future with renewed optimism.

WHEAT IN THE WEST AND THE WHEAT POOL

By A. H. Reginald Buller, Ph.D., D.Sc., F.R.S.

Professor of Botany at the University of Manitoba

The First Wheat Crops in Western Canada. The earliest attempts at the cultivation of wheat in western Canada are associated with the vicissitudes of the Selkirk settlers and date from the year 1812. This little band of pioneers was sent out from Scotland by Lord Selkirk, *via* York Factory, to colonize 116,000 square miles of territory granted to him by the Hudson's Bay Company (Fig. 1). An advance party of twenty-two men under the direction of Miles Macdonell arrived at the junction of the Red and Assiniboine rivers on August 30, 1812; and there they founded the Red River Settlement. To make provision for the future, they at once began to turn up the sod; and part of the breaking was sown with winter wheat brought from their native land. Some spring wheat having the same origin was also sown early in 1813. In the autumn of that year, the settlers, whose number by this time had increased to nearly one hundred, were dismayed to find that the wheat harvest was a total failure. There was nothing to be done but to try again; but again Fortune refused to smile upon the newcomers, and the crop of 1814 was as bad as its predecessor. But Scottish persistency was to win in the end, for the third attempt at wheat-growing, made in 1815, was eventually brought to a successful conclusion.*

The failure of the first two crops of wheat was due partly to the fact that the earliest settlers to arrive at

*In writing this article the author has drawn freely upon his *Essays on Wheat* (1919, The Macmillan Co., New York), to which the reader is referred for fuller details and references to the literature.

the Red River were crofters who knew more of fishing than of farming, and partly to the absence of adequate farm implements. There was not a plough in the whole colony, the one harrow was incomplete and could not be used, and all the labour of breaking up and working

Map showing Lord Selkirk's grant of land, the route of the Selkirk settlers, 1811-15, and the present boundaries of the Province of Manitoba.

over the tough prairie sod had to be done with the hoe. The Indians looked on with surprise and amazement at the man with the hoe seeking to gain a sustenance from the soil, and to show his contempt for such work nicknamed the colonists "Jardiniers."

The first harvests stood in danger from the air, for each autumn flocks of birds, including the now extinct passenger pigeon, settled in the fields, and considerably diminished even such small crops as had been produced.

2. Troubles with the North-West Company. The Red River settlers, in the first few years of their history, had not merely to struggle with nature to provide themselves with their daily bread but also with their fellow men. The North West Company, who, as fur-traders, were the great rivals of the Hudson's Bay Company, resented the establishment of a civilized community in the heart of the Indian country: firstly, because it was planted directly across their main line of communication between the northwest and Montreal and, secondly, because it was situated on the very plains from which they drew their supplies of pemmican for their voyages from Fort William to the posts of the fur-trappers. The Company feared that the Settlement might eventually destroy the fur-trade, and they therefore determined to destroy the settlement.

In the spring of 1815, the Selkirk settlers sowed their wheat and barley; but many were the hardships to be borne before the crops could be reaped. In June, the North-Westers with their half-breed adherents overawed the colonists by a show of force. They trampled upon the crops, stole the horses, and burnt Fort Douglas, the colony mill, the stables and barns to the ground; and Miles Macdonell, the governor of the colony, surrendered himself as a prisoner. Most of the settlers left in North-West canoes for Upper Canada, and thirteen families made their way up Lake Winnipeg to Jack River and settled at a place now known as Norway House. John McLeod and three others, however, succeeded in weathering the storm and remained at the Forks. They stored what property they could in a single log-house and stoutly defended themselves with a three-pounder cannon fed with lengths of chain obtained from the adjoining blacksmith's shop. Their half-breed assailants, who were on horseback, could not face this piece of artillery and soon desisted from their attacks. In the

end, McLeod and his little garrison were left in peace to care for the crops and prepare for the return of their friends.

Colin Robertson, in charge of an expedition sent out by Lord Selkirk from Montreal, arrived at the Red River a few weeks after the expulsion of the colonists. On learning what had happened, he immediately pushed up Lake Winnipeg to the Jack River, persuaded the settlers to return, and brought them back in triumph. They were delighted to find that, during their absence, the crops had made good progress; and within a few weeks the first successful harvest was duly gathered in.

The new governor, Robert Semple, who had been sent out from Scotland by the Hudson Bay route, arrived at the Red River Settlement on November 3, 1815. On finding that there were one hundred and twenty persons committed to his care, he at once began to feel anxious about the food-supply for the winter. Straightway he went to the granary, where a rapid inspection revealed that the stores of grain consisted of from twelve to fourteen stacks of wheat and barley. Would this satisfy the needs of the settlers and keep famine from their doors until the next harvest? A resort to mathematics could alone settle the question. Taking each stack as representing 50 bushels, he calculated that he had 400 bushels of wheat plus 200 bushels of barley. From these 600 bushels he deducted 40 for spring seed and so had 560 left. Counting 50 pounds to the bushel, he calculated that the grain which could be used as food amounted to 28,000 pounds. He then reckoned that 120 persons at 2 pounds per day would consume 240 pounds per day, and that this was equal to 7,200 pounds per month or 28,800 pounds for 4 months—an amount of grain but little more than the 28,000 pounds he actually had at his disposal. And so the Settlement would be free from the trials of hunger throughout the winter of 1815-16. "How was my heart relieved," writes Semple to Lord Selkirk, "when I arrived at the end of this simple calculation which I tried again and again for fear of a mistake."

In the spring of 1816 the settlers sowed the forty bushels of seed wheat and barley which had been saved from the crop of the previous year, but alas for their hopes of harvest! Within a few short weeks, when every field was putting on its summer garb of green, the colony was to be broken up once more, and a goodly number of the settlers were to find their graves. The quarrel between the rival companies came to such a pass that, on June 19, a bloody combat took place between their forces. A boy on the watch-tower of Fort Douglas sighted a large gathering of hostile half-breeds; and Governor Semple and about thirty of his men went out to meet them. At a spot known as Seven Oaks, a few miles north of Winnipeg near the Red River, the two parties came together. The half-breeds were painted and disguised. Hot words were exchanged, a shot was fired, and in the fight which followed Governor Semple and twenty of his men were left dead upon the field. The rest of the settlers in bereavement and despair made their way up Lake Winnipeg and, after a long and wearisome journey, again took up their abode at Jack River. The North-Westers occupied Fort Douglas until the end of the year; and, after this second expulsion, no colonist was permitted to remain to gather in the crops.

Early in 1817, in the depth of winter, a force sent from Fort William by Lord Selkirk wrested Fort Douglas from the North-West Company. A surprise attack was made in the dead of night: the walls were scaled, and the sixteen men within were all made prisoners. When daylight came, the flag of the Hudson's Bay Company was again hoisted on the staff. With the arrival of spring, an express canoe was dispatched to Jack River with the news that Fort Douglas had been taken. The settlers were persuaded to return and, in the hope that peace might finally be established, resumed their agricultural pursuits. The facilities for tilling the soil were, however, extremely limited, and it was still necessary to use the hoe in place of the plow. Wheat was sown although late in the year and, owing to its scarcity, in small quantity. It grew well, but, in the autumn, the

crop was almost ruined by a violent hurricane. So short of cereals were the colonists during the winter of 1817-18 that they had to rely upon the buffalo as a chief source of food.

3. Visit of Lord Selkirk. Lord Selkirk, who was an experienced agriculturalist, arrived at the Settlement in the summer of 1817, and for four months exercised a wise and generous supervision over its affairs. His heart was in this work, for he had great visions of the future. His belief in the possibilities of the western prairie-land he once expressed in a remarkable prophecy: "It is a very moderate calculation to say that, if these regions were occupied by an industrious population, they might afford ample means of subsistence for thirty millions of British subjects." So anxious was Lord Selkirk to encourage agriculture that before his arrival, in 1815, he had authorized Semple and Robertson to offer on his behalf a prize of £50 to the farmer who should raise the largest quantity of grain in proportion to the number of hands employed.

Lord Selkirk left the Settlement on September 9, 1817, for Montreal, in order to answer charges brought against him at the instigation of the North West Company. The litigation in which he became involved affected his health, which he attempted to recover by a visit to Pau in France. There his end came on April 8, 1820; and the man whose indomitable spirit caused the sowing of the first fields of wheat in western Canada and who, with the insight of a seer, foresaw the present and the future agricultural prosperity of the far-spreading prairie-land, now lies buried in a French graveyard. The North West Company and the Hudson's Bay Company settled their differences by amalgamation in 1821, a year after Lord Selkirk's death.

4. The First Farms. The Red River Settlement, in the first few years of its existence, concentrated its farming operations in what is to-day known as the municipality of Kildonan. It was arranged that each settler should purchase one hundred acres of land at five shillings an acre, but Lord Selkirk relinquished his claim to pay-

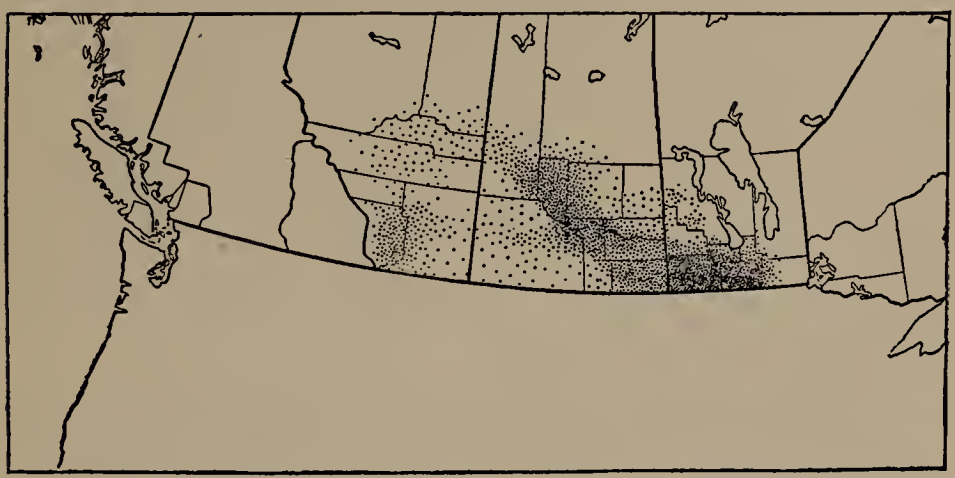
ment, when he visited the colony in 1817, in order to help the settlers who had suffered so much in the two previous years. For the purpose of giving each farmer access to the main highway—the Red River—and to secure the advantage of compactness for the colony as a whole, the farms were all made long and narrow with one end fronting on the water, and were placed side by side in a parallel series.

5. The St. Paul Railway. Soon after Manitoba had been organized as a province (1870), settlers began to pour in to it from the south. Immigrants from Ontario and the Old Country were compelled to come through the United States to Chicago, then northwest to St. Paul, and then northwards across 450 miles of level prairie. For eight years a stream of immigrants made the long journey into Manitoba by wagon, by coach, and by Red River steamer; and great was the relief to the traffic when at last, in 1878, the first railway entered the province from the south. This new means of communication gave a direct connection between St. Paul in Minnesota and the little town of St. Boniface on the right bank of the Red River. On arriving at railhead, the settler, in order to get to Winnipeg, had merely to cross the river in a ferry boat.

6. The Canadian Pacific Railway. The St. Paul Railway was a great boon and formed a splendid link with the United States; but something still was lacking. The rising spirit of Canada, supported by the voice of Manitoba, demanded that an all-Canadian railway should be built across the continent, so as to give the West a direct connection with the East. This great project was eventually brought to a successful conclusion, with the result that in 1886 there took place an event of outstanding significance for the subsequent development of wheat-growing in western Canada: there passed through Winnipeg on Dominion Day, July 1, the first through train from Montreal to Vancouver. Its engine, *Canadian Pacific Railway No. 1*, ran upon a line of steel destined to bear to the country's ports hundreds of

millions of bushels of wheat required to satisfy the world's craving for bread.

A grain of wheat is a very tiny thing in itself, but the prosperity of western Canada is bound up with its existence; and it is not too much to say that without the grain of wheat in its collective form the great and thriving city of Winnipeg, with its population of 300,000 souls, its imposing buildings, its fine streets, and its busy cosmopolitan life, would scarcely have advanced at the present time beyond the status of a small trading station. The growth of Winnipeg from a village of 215



Combined acreage of spring-sown and autumn-sown wheat in western Canada. Each dot represents 5,000 acres. From *Geography of the World's Agriculture*, by V. C. Finch and O. E. Baker. Courtesy of the United States Department of Agriculture.

people in 1870 to its present proportions has been due in large measure to the construction of the Canadian Pacific Railway, the connecting of the east and west parts of Canada by a band of steel. Through mile after weary mile for hundreds of miles was the track pushed from the east, past lake and swamp and stream, onwards amid the lonely forests of pine and poplar, of spruce and birch, on, on, through all that long stretch of rocky boulder-strewn country north of the Great Lakes which was swept bare of soil in the dawn of human history, onwards and ever onwards, until at last it reached the west. All the vast difficulties in the path of the engineers were overcome because the men behind

the Canadian Pacific Railway were men of vision, men who could see in the mind's eye under the blue dome of heaven the golden grain which would come to clothe the fertile acres of the broad prairie-land. Surely the brightest dreams of the founders of the Canadian Pacific Railway have been amply justified by events.

The completion of the eastern half of the Canadian Pacific Railway immediately provided that direct connection with the Old Country market for which Manitoba had been longing; and soon the agricultural progress and prosperity of the west were assured. The tide of immigration grew ever stronger and Winnipeg became the great gateway to the new land of promise. The buffalo disappeared, the Indian gave place to the white man, and vast tracts of the virgin prairie were turned with the plough. The wheat of the prairie provinces, on account of its high quality, acquired universal fame, and Canada came to be called "the granary of the British Empire." How well that granary served the cause of the Allies in its time of trial needs no telling, for it is known to the whole world.

7. Wheat-growing at the Present Day. The rapid progress made by western Canada in recent decades is reflected by the crop returns, some of which are as follows:

1904	56,000,000 bushels
1906	102,000,000 "
1913	209,000,000 "
1915	360,000,000 "
1923	460,000,000 "
1928	511,000,000 "

In 1928 the western wheat crop was by far the largest on record. In 1929, owing to drought, the crop was reduced to about 271,000,000 bushels, but its quality was unusually high. Canada herself is able to use about 100,000,000 bushels, and thus the 1928 crop provided about 400,000,000 bushels of wheat for export. When it is remembered that as yet not one-half of the good agricultural land of the west is under the plough, the confidence of western Canadians in the future of their half of the Dominion seems to be well justified.

At the present time Canada is the greatest wheat-exporting country in the world, and in this respect now far surpasses her southern neighbour, the United States.

The chief wheat-growing province is Saskatchewan, after which comes Alberta and then Manitoba (1929). In Fig. 2 is reproduced a map, originally published in 1917, which shows the acreage sown to wheat in the three prairie provinces. In 1928 the total area under wheat in these provinces was 23,000,000 acres.

Winter wheat has a higher yield than spring wheat, wherever it can be successfully grown. However, on account of climatic conditions, very little winter wheat is grown in western Canada. In 1928 the acreage devoted to winter wheat in the west was only two-fifths of 1 per cent of the total wheat acreage. Manitoba, Saskatchewan, and Alberta must therefore be thought of as spring-wheat provinces.

The wheats sown in spring are hard red varieties, the chief sort being *Marquis*, which has now practically replaced the old standard *Red Fife*. The winter wheats sown in the autumn in Alberta are chiefly *Turkey Red* and *Kharkov*. In the drier parts of southern Manitoba and southern Saskatchewan, durum wheats (sold for making macaroni) are grown to a considerable extent, their culture having increased during the last few years owing to their being more resistant to the rust disease than bread wheats such as *Marquis*.

The virgin prairie is usually broken in the month of June. Its surface is then cultivated and left uncropped until the following spring. Thus the prairie grasses, etc., are prevented from growing and using up moisture, and the moisture is stored and conserved in the newly-broken land.

Until recently, but little or no attempt was made to apply manure or fertilizers to the land, and the grain fields were cropped year after year without anything being added to them. Of late, however, with the introduction of mixed farming, farm-yard manure has come to be commonly used, particularly on lighter soils. This practice has been found to increase the yield of the crops

on soils which have long been cultivated and thus to add to the profits of farming.

On account of the low rain-fall, moisture limits the yield of grain per acre. The bare fallow, or some modification of it, is therefore resorted to once in from two to five years, more often in the drier districts and less often in the more humid ones. The summer fallow is the basic practice of dry farming. Its purpose is to store moisture in the soil by means of a soil mulch created by surface tillage. The surface tillage breaks the capillary tubes in the soil and so lessens evaporation.

In older districts the summer fallow has a double function, for it is not only used to conserve moisture, but also to control weeds. Among the annual weeds which have proved to be pests are wild oats (*Avena fatua*) and various members of the Mustard family; and, among the perennials, Sow Thistle (*Sonchus arvensis*), Canada Thistle (*Cnicus arvensis*), and Quackgrass (*Agropyron repens*). The very dry parts of southern Alberta and Saskatchewan are troubled with the Russian Thistle (*Salsola Kali*). Practically all the noxious weeds of the west have been introduced directly or indirectly from Europe.

The seed-wheat, before being sown, is usually cleaned by passing through a fanning mill and then treated with formalin or copper-carbonate dust to kill any spores of the Stinking Smut Fungus (*Tilletia tritici*) which may be clinging to the kernels and which, if not destroyed, might germinate on the kernels in the soil, infect the seedlings, and cause smut-balls instead of sound kernels to be produced in the heads of the diseased plants.

The wheat grower endeavours to prepare the land to be sown so that it shall be well stored with moisture, free from weeds, firm, and mellow. After seeding in such soil at a depth of from one to three inches, the depth varying with the soil's moisture content, the land is generally firmed down by using a packer and then harrowed to create a mulch to lessen the evaporation of moisture. Seeding is accomplished by means of a large drill drawn by a team of horses or an engine, and as a

rule is completed between the middle of April and the tenth day of May. The crop usually heads out during the first half of July and ripens between the tenth of August and the twentieth of September.

The crop, in general, is harvested by means of self-binders drawn by horses or driven by a tractor. Each binder cuts a width of from six to eight feet and, at the same time, ties the grain into bundles or sheaves which are thrown to the ground. The sheaves are then placed in stooks or shocks by men who follow the binder as closely as possible. The grain is separated from the straw by means of large threshing machines driven by tractors and having a capacity of from 500 to 2,000 bushels per day.

Within the last two or three years some thousands of combined cutting and threshing machines, known as *combines*, have been introduced into western Canada. These machines, which are driven by tractors, cut and thresh the grain in a single operation, thus considerably reducing the harvesting period.

The harvesting and threshing season is the busiest part of the year in western Canada. To assist in relieving the labour shortage, which is always felt at this time, some 20,000 to 30,000 extra harvesters have been annually brought to the prairie provinces from the east of the Dominion and from the United States. In the summer of 1928, 10,000 additional harvesters came to western Canada from the British Islands.

The western plains, in general, are very level and free from large trees, and hence are easy to break with the plough. The soil is thick and rich in humus and gives a good crop from the first. The chief difficulties of wheat-raising arise from temporary droughts in summer, drying winds, early fall frosts, occasional severe attacks of the Black Stem Rust disease, and local hailstorms. Rain, however, seldom falls in too large a quantity, and the weather during the harvesting and threshing season is usually dry and bright. There is no more exhilarating sight in the west than the prospect of the binders at

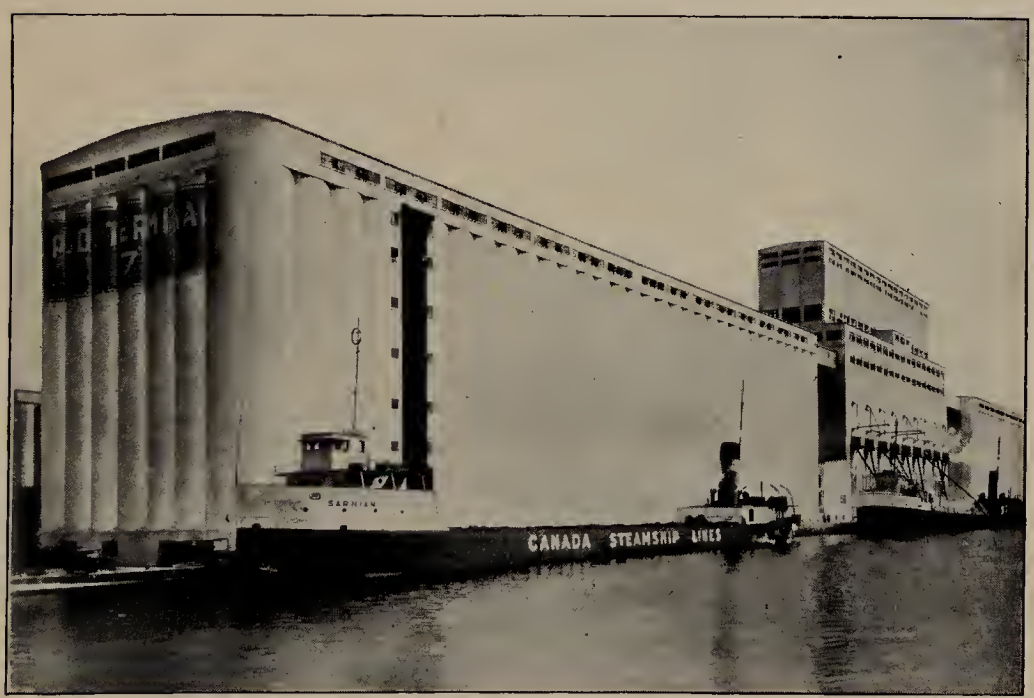
work on the sea-wide sky-skirted prairie, with the golden grain gleaming under the August sun and above and about all the cloudless blue of the heavens. And when the last sheaf has been cut and the binders are silent, how splendid is the view across the gently rolling stubble fields; stook beyond stook, stook beyond stook, for a quarter of a mile, for half a mile, and still more stooks as far as the eye can see, stooks cresting the distant horizon, ten thousand stooks all waiting to be threshed and each with its promise of bread, the gift of the New World to the Old (Fig. 3).

8. Marquis Wheat. All the Marquis wheat in existence originated from a single grain planted by Dr. Charles Saunders in an experimental plot at Ottawa in 1903. Of this kind of wheat, in North America, 250,000,000 bushels were raised in 1917, 300,000,000 bushels in 1918, and upwards of 500,000,000 bushels in 1928. Marquis is the offspring of a cross between Red Fife (male parent) and Hard Red Calcutta (female), the former excelling in milling and baking qualities and the latter in earliness. Marquis yields more highly than Red Fife and other wheat varieties which it has replaced, and its productiveness was a factor of considerable help to the Allies in the Great War. Dr. Charles Saunders, who by discovering and introducing Marquis wheat increased the wealth of Canada and the United States by many millions of dollars, retired from his position as Dominion cerealist on account of ill-health a few years ago and is now residing at Ottawa. For his services to Canada he was rewarded by parliament with a special pension.

9. Elevators. To store the grain produced on the farm before it can be exported or otherwise used, special warehouses, known as *elevators*, are provided. The wheat is *elevated* into these buildings by machinery and deposited in bins. The bottom of the shipping bin is always situated at some distance above the level of the ground and opens into a movable spout on the exterior of the elevator. When it is desired to ship wheat away from an elevator, advantage is taken of the flowing property of grain in bulk: the spout is opened and the

WHEAT IN THE STOOK IN WESTERN CANADA

Courtesy of the Immigration and Colonization branch of the Government of the Province of Manitoba



THE SASKATCHEWAN WHEAT POOL TERMINAL ELEVATOR, NO. 7, AT FORT WILLIAM

The railway track is immediately behind the building and cannot be seen. The water in front is part of Lake Superior. The elevator has rows of storage bins to the right and left and the working house in the centre. The lake steamer to the right is being loaded: the wheat is flowing through the metal spouts into the hold. The lake steamer to the left is partially loaded, and may be waiting to take on another grade of wheat. Courtesy of the Canadian Wheat Pool.

grain falls through it by gravity and passes into a box-car or the hold of a steamer.

Elevators are of several kinds. There are *country elevators* along the railways for receiving grain from the farmers for storage before it has been inspected, *terminal elevators* which receive or ship grain and which are located at points declared to be terminal so far as inspection is concerned, *hospital elevators* which are used for cleaning or specially treating rejected or damaged grain and which are equipped with machinery for that purpose, and *mill elevators* which are used or operated as part of a plant engaged in the manufacture of grain products. In the Western Inspection Division of Canada, for the licence year 1928-29, there were 2,042 railway stations having elevators, the number of elevators was 5,585 (including 55 terminal elevators), and the total capacity of all the elevators together was 312,000,000 bushels.

A terminal elevator at Fort William or Port Arthur (Fig. 4) is situated upon the lake front, so that the grain which it contains may be passed directly into the hold of a lake steamer. It is usually divided into two parts: the *working house* and the *storage bins*. The working house is rectangular in shape, much higher than it is long or broad, and has numerous windows in its upper half. Here the wheat is received from the railway box-cars, elevated, weighed, temporarily stored in smaller bins, and cleaned. Here, too, are situated the shipping bins from which the wheat passes into the freight vessels. The storage bins, on the other hand, are great concrete cylinders which stand vertically upright and are connected by concrete where they are in contact. There may be several parallel rows of them. The space between every four adjacent cylinders is not wasted, but is used as a smaller bin. Running over the top of each row of bins is a passageway which leads from the upper part of the working house. The grain is conveyed along these passages and is deposited in the bins from above. Each bin can be filled from the bottom to the top, and a single cylinder may hold as much as 30,000 bushels of grain. Under each row of

bins there is a tunnel leading to the base of the working house. The wheat is let out of a bin through a hole in its base. The capacity of an elevator depends on the size and number of its cylindrical storage bins. The bins are cylindrical because engineers have found that cylindrical bins resist the pressure of the grain within better, and require less concrete in their frame, than bins of any other form. The different grades of wheat are kept in separate bins. When a car-load of wheat has been put in a bin with other wheat of the same grade, it loses its identity and cannot again be recovered. Wheat in a terminal elevator is therefore stored in bulk according to grade.

The passage of wheat through a terminal elevator is by far the cheapest and most efficient means of taking it from box-cars and getting it on board a lake freight-boat, for loading simply consists of letting the wheat out from a shipping bin through a spout so that it flows by its own weight into the hold. The rapidity with which the cargo boats can be loaded from a terminal elevator is truly astonishing. The average loading run to any boat is about 30,000 bushels an hour; but the record speed for loading at the head of the lakes is 142,000 bushels in one hour. This record was made at Fort William, at the Saskatchewan Wheat Pool Elevator, No. 7, the largest and most up-to-date terminal elevator in the world with a capacity of 7,000,000 bushels (Fig. 4). From the great bins of this elevator on October 4, 1929, in three and a half hours, there poured into the hold of the *Lemoyne* 500,000 bushels. Another hour was taken to trim the cargo and then the *Lemoyne* was ready to sail.

10. Sampling and Grading of Wheat. An essential element in the grain business of western Canada is the classifying or *grading* of grain by government inspectors. The wheat is bought, sold, transported, and stored in bulk according to grade. The work of grading is largely concentrated at Winnipeg. When a grain train from the west arrives at Winnipeg, a sample of wheat is obtained from each car and then taken to the Dominion inspection office. The inspectors there determine the

grade of wheat in each car from the sample supplied. During the busy season as many as 2,000 cars are often graded by the Winnipeg inspectors every day.

11. Vancouver and the Hudson Bay Route. The opening of the Panama Canal presented the possibility of shipping Canadian wheat to Europe from ports on the Pacific coast. In 1917, a test experiment was made with wheat loaded at Vancouver. A cargo of grain, with experts from the Dominion Grain Research Laboratory on board, was taken from Vancouver down the Pacific Coast, through the Panama Canal, and across the Atlantic to London, the voyage occupying three and a half months. This initial shipment of grain *via* the Panama Canal was successfully carried out, with the result that Vancouver in the past few years has been rapidly developing into a great grain-exporting port. During the crop-year 1928-29 this city exported some 95,000,000 bushels of western wheat; and, doubtless, in the future, this business is destined to grow. A great advantage enjoyed by Vancouver as compared with Montreal and Quebec lies in this: that, whereas the eastern ports are frozen up during the winter, the western one is open the whole year round.

At the present moment Canada's surplus wheat flows out from the country through ports on the Atlantic and Pacific Coasts, but shortly it will begin to flow out from the port of Churchill on the Hudson Bay. The sea route from Churchill to the British market is shorter than that from New York. The railway line from Saskatchewan through northern Manitoba to Churchill was completed on Good Friday, 1929, and it is expected that the export of wheat through the Hudson Bay will begin within a year from the present time.

12. The Wheat Pool. There are four wheat pools in western Canada: the Manitoba, the Saskatchewan, and the Alberta Wheat Pools; and these conjointly operate a Central Selling Agency commonly called the *Canadian Wheat Pool.* The Alberta Wheat Pool was organized in 1923, and the Saskatchewan and Manitoba Wheat Pools in 1924, in which year also the Central Selling Agency

came into being. The head office of this agency is in the Wheat Pool Building on Main Street, Winnipeg.

The farmer members of the Wheat Pool now number 140,000, and they raise wheat on 15,000,000 of the 23,000,000 acres devoted to wheat production in western Canada. The farmer members contract to deliver their wheat to the Pool for a period of five years, and at present the second contract period is in progress. The farmers deliver their wheat to the Pool and at once obtain an initial payment (usually $1.00 per bushel); and, when the crop has been sold some months later, they receive the balance due to them. Each pool member in the end receives the average price at which his grade of wheat was sold throughout the year. When the Pool began its work, it had no marketing facilities, but now (1930) it has acquired from old Line Elevator Companies and has built 1,636 country elevators with a capacity of 57,000,000 bushels; while, at the head of the lakes, it controls eight terminal elevators, with a capacity of 26,000,000 bushels, and, on the Pacific Coast (Vancouver and Prince Rupert), three terminal elevators, with a capacity of 8,000,000 bushels. To finance the upbuilding of its elevator system, the Pool, in accordance with its contract, deducts two cents per bushel from the selling price. By this means by August, 1930, the Pool will have accumulated a fund of $30,000,000.

Through the Pool the Canadian farmer sells his wheat directly to the foreign miller, thus eliminating the handling charges of many middlemen. In 1928-29, the Pool shipped 108,000,000 bushels of wheat to ninety ports in nineteen different countries.

The Pool is owned and controlled entirely by farmers and is the world's greatest non-profit producers' co-operative marketing association. It is attracting attention throughout the whole world, and it is not improbable that, within a few years, certain other countries will adopt its methods and form Pools of their own.

THE CANADIAN NORTHLAND

By R. C. Wallace, M.A., Ph.D., D.Sc., LL.D.

President, University of Alberta

In the early days of exploration and trade, interest was focussed in the territory which we are now accustomed to call the Canadian Northland. The Hudson's Bay Company established itself in 1670 on the shores of Hudson Bay, though not for a century did that company seek to build posts inland. It did so then, however, because the fur-trade, through independent traders, had found its way to Montreal by way of the Great Lakes. The great achievements in travel and exploration—the journey of the boy Kelsey far into the buffalo plains, the expeditions of La Vérendrye and his sons up the Saskatchewan River, Samuel Hearne's epoch-making journeys across country in search of the Coppermine River, Alexander Mackenzie's voyages down the great river that bears his name, Franklin's trips across to the Coppermine River and along the Arctic coast, and the great search for the northwest passage, in which Franklin is the central figure—all this background of stirring achievement rests on the territory which we now call the Canadian Northland. And until after this period of exploration, there was little of interest in the south country west of the Great Lakes. Even as late as 1875 the intention of the sponsors of the Canadian Pacific Railway was to build across the Rockies by the northern route—the Yellowhead Pass—through which the Canadian National Railways now passes, and there were not lacking those who strongly urged the claims of the Peace River route two hundred and fifty miles further north than the Yellowhead Pass. That fact reveals the north-mindedness of Canada even as late as sixty years ago.

With the advent of the railway into the western prairies there came the period of agricultural expansion of Canada,

the carving out of the western provinces and the elevation of Canada to the important position she now occupies as a wheat-producing country. During this period the Northland has been of lesser significance. Attention has been concentrated on the problems of the plains, and they have been all-absorbing. The tide of immigration which flowed into Canada from the time of the completion of the Canadian Pacific Railway until 1913 flooded the prairies, but did not move northward. The trapper continued to pursue his calling, the fur companies to supply the needs of northern peoples and to purchase the furs which were almost the only inducement to northern endeavour. A great chapter was being written in Canadian economic history, and the energies and interests of the population of central Canada were absorbed in establishing western agriculture and eastern industry to meet in part the needs of the growing West.

But the pendulum of time again swings northwards in matters Canadian. The settling of agricultural spaces will still go on for many years, and the process will call for sound statesmanship and able administration. The knitting together of agricultural progress with industrial development will be Canada's major task for the next half-century. But the youth of Canada listen for the call of romance, nurtured as they are on Canada's romantic history. There has been a new note in those last few years which has had in it, for young people, something of the discriminating appeal of the call of the pied piper. Mr. Stefansson, the Arctic explorer, has shown us that the so-called barren lands are capable of supporting immense numbers of reindeer which may add material contributions to Canada's meat supply, and already steps have been taken to introduce the European reindeer into the lower Mackenzie valley. Ontario has now a history of twenty-five years of remarkably successful conquest of northern territory in the mining of nickel, copper, silver, and gold from the unyielding Precambrian rock; and the example of Ontario has fired the enthusiasm of Quebec, Manitoba, Saskatchewan, and the North West Territories north of Alberta to similar endeavour with very tangible

results. The boundaries are being pushed back from the south, not from the north as in the early days, and the conquest of Canada's last unknown territory is proceeding apace. The conquest is proceeding, in point of fact, at a rate which fifteen years ago was not considered possible by those who were engaged in mapping and exploring northern territory by the laborious method of canoe travel. The aeroplane has conquered distance and has provided the means of mapping territory with amazing accuracy where mapping was heretofore slow, difficult, and inadequate. At the present rate of progress, northern Canada could be completely mapped in the next fifty years if it were considered advisable so to do. By the methods in vogue fifteen years ago, it would have taken many centuries to map the Canadian Northland, and there would have been little hope of ever presenting a completely accurate map of the topography of northern Canada. The journey from Churchill to the Coppermine River, which Samuel Hearne reached with such difficulty after two unsuccessful attempts a hundred years after the Hudson's Bay Company had established itself on Hudson Bay, can now be made in two days by aeroplane, and at any time of the year except when the ice is making or breaking in the inland lakes. When faced with the aeroplane, the vast distances of the Northland have shrivelled into insignificance, as did Alice before the rabbit hole when on her voyage of exploration into territory hitherto unknown.

In the minds of the people of Canada, the Northland is synonymous with the Canadian shield of Precambrian rock which flanks Hudson Bay to the east, south, and west, and stretches southwards into Lake Superior and beyond the confines of Canada into northern Michigan, northern Wisconsin, and northern Minnesota. While the Precambrian shield is not the whole of the Northland —for the lower Mackenzie valley is beyond its confines, and the islands of the Arctic are of later age—and while much territory belongs to the southern edge of the shield, which cannot be strictly called Canadian North, yet this geological unit presents such strongly defined character-

istics, which are so typically northern, that for practical purposes it may with reason be thought of as the Canadian Northland. It is the early continent, the oldest rock system in North America, and through all the vicissitudes of geological history remained for the most part above sea level, while from time to time the greater part of the continental area was submerged. During the long years since its formation, it has been deeply denuded by atmospheric forces, and in late geological times was swept bare by the ice sheets that moved southwards over its surface. The smooth hummocky expanses of granite and gneiss which stud the whole Precambrian area bear many traces of the movement of those ice-sheets. The rivers spill from rock basin to rock basin. The jackpine has a precarious foothold on the almost bare rock surface and on the sand ridges, while in clay-covered areas spruce and poplar flourish, and in the undrained swamps and muskegs tamarack and black spruce may find satisfactory conditions for growth. Deep though the erosion has been through the geological ages, there are still to be found the roots of some of the ore-bodies which were formed during the periods of intense volcanic activity which characterized the Precambrian area. The search for these ore-bodies has been the driving force behind the new attack on the fastnesses of northern Canada. The movement began with the discovery of the Cobalt silver camp in 1905, and was followed by the discovery of the Porcupine goldfields in 1909. Since that time has come the development of the Kirkland Lake gold area in Ontario, the Rouyn copper-zinc area of northern Quebec, the Flin-Flon-Sherrit-Gordon copper-zinc area of northern Manitoba and Saskatchewan, and the new discoveries of copper and zinc in the Sudbury field of Ontario, famous since the eighties of last century as an outstanding nickel deposit of the world. To these ore-bodies railway transportation has been made available, and communities of considerable size have been established in the mining and refining of the ore-bodies, in the raising of garden products for the new populations, and in the carrying on of general business. New discoveries are being tested out in many

areas, and the aeroplane is made use of to explore territory far removed from present railway facilities. Mining machinery for exploration purposes has been accommodated to the new conditions, so that it may be taken down and transported in parts by aeroplane to any desired locality. There will still have to be faced the problem of providing some low-cost form of transportation to deposits, when "proved up," at distances from present railway facilities so great that the provision of railway communications would be unjustifiable.

Power development and the pulp industry have followed the mining industry northwards, and, particularly in Quebec and the eastern part of northern Ontario, these two phases of northern development have made a very significant contribution to Canada's economic welfare. With power has come in Quebec as well the establishing of chemical manufactures, which have transformed part of northern Quebec from wilderness into hives of modern industry. In many parts of northern Canada progress will go forward under most satisfactory conditions, if the development of power is associated not only with mining, but with pulp manufacture as well. The other possible industries of the north, fishing and the fur business, are accessory to the three major industries already discussed. There are many lakes where fish are abundant. The amount of annual catch must be carefully restricted in order that the supply of fish be not depleted. The fur industry cannot be maintained as settlement moves northwards. To an ever increasing degree, as time goes on, fur-farming will be engaged in to supplement the natural catch which will undoubtedly diminish as settlement proceeds.

The traveller from eastern to western Canada is invariably impressed by what appears to be the barren waste of territory north of Lake Superior and westwards to Winnipeg. It is in territory of that type that the industries which have been here described are making progress. A definite contribution is being made to Canada's economic welfare in areas which seemed inhospitable to economic treatment. But there is another phase of

the situation which should be stressed. Eastern Canada and Western Canada are separated by this Precambrian rocky country, which has not been favourable to settlement. There is a great wedge driven deep into Canada from the north, which has pushed apart the eastern and western people. Economic philosophies have developed from different backgrounds and environments; political conceptions have been at variance; and there has been serious concern to those who have looked forward to a national consciousness which would represent a reasonably united viewpoint on fundamental economic principles. There is now developing throughout the northland a consciousness which will provide the uniting link between East and West. The northern pioneer, whether he be trapper, lumberman, or miner, is of one type from Quebec to the North West Territories. His outlook is the same, his method of approach to his own problems is the same, and his contribution is the same. His is an industrial outlook, but closely knit to the raw materials with which he has to deal. There is nowhere in Canada a more united consciousness than that which is possessed by the newer population in Canada's Northland. It is a link of the finest kind and will play a part of which many Canadians are as yet but dimly conscious, in uniting the separate populations of the far-spread Dominion. And there is another factor which gives encouragement. The development of northern industries calls for very high scientific, technical, and engineering skill. There are now to be found in every newer settlement throughout the north young men of university training, skilled, resourceful, and thoroughly competent to handle themselves under northern conditions. They have the conservative attitude of the scientist, and the vision of the northern pioneer. The contribution which this army of young men will make to Canada's welfare in the next sixty years will be greater than even an optimist would dare to forecast.

THE CANADIAN NATIONAL RAILWAY SYSTEM

By Sir Henry Thornton, K.B.E.

President, Canadian National Railways

DEDICATED to the welfare of the Dominion in a larger sense than purely selfish motives might demand, the Canadian National Railways System is, first and foremost, a great enterprise in partnership. More times than I can recall, I have emphasized the spirit of co-operation that gives life and character to what might be called the body of the railway, the thousands of miles of steel, the thousands of locomotives and cars, the hotels, the telegraph lines, the steamships, which comprise the National System. In their place, statistics are very well. They are of the greatest practical value in a railway organization, which is built up of an infinity of complicated details; but they cannot be relied upon to give a true, a complete picture of the railway. There is much more to a man than the fact that he is five feet so many inches tall and weighs so many pounds. Statistics tell us that the Canadian National Railways operate more than 23,000 miles of main lines. But this is only one physical feature. This is no more than a clue. Those 23,000 miles make up the steel skeleton of the system. What of the nerves, what of the brain, what of the soul? It may be that modern psychology has abolished the soul, but what of that essence, that driving force, that intelligence, whatever it is, we used to call the soul? The intelligence and the power of the railroad is, of course, human sensibility and energy. Again, statistics tell us that the human element in the National System is made up of more than 100,000 individuals. What the railway is today, after seven years of astonishing growth, is entirely because of the labour,

the ability, and the loyalty of this hundred thousand. Nor is this all. The co-operation that has built up the system and that keeps it running, and improving itself as it runs, and striking out into new channels of service, is the co-operation not only of the men and women actively engaged in the work of the railway, but of hundreds of thousands of others; it is the co-operation of the people of Canada, for after all, the railway is theirs; they are all shareholders and they are all closely concerned in its welfare.

As an enterprise in partnership, as an instrument built up by the people of Canada for their own use, the National System came into being at the end of 1922. The materials of which it was created were many and diverse, chief among them the Grand Trunk, the Canadian Northern, the Grand Trunk Pacific, the Transcontinental, and the Intercolonial. They all did their part in opening up Canada in the days of the pioneers, but they made mistakes, they crumbled, and it was a step in the public interest that the government of Canada took in amalgamating them and creating out of the chaos the Canadian National System. An Act of Parliament will not, however, create a useful and prosperous railway out of an accumulation of ruins. We, the hundred thousand, had many problems to overcome; the Canadian people had the problems of faith and loyalty; ours was the more practical riddle of deficits that were to be transformed into surpluses, of conflicting railway lines that were to be bent to one enterprise, of an actual railway that was not only to be created, body and soul, and maintained in the best interests of its owners, the people of the Dominion, but was to grow and fulfil a high destiny in the upbuilding of a rich young country.

The cold figure, 23,000 miles, means that the Canadian National Railways form the largest, although the youngest, railway system in North America. The true significance of the figure is that the railway serves Canada from Sydney, on the extreme east of the Dominion, to Vancouver and Prince Rupert, on the extreme west; that it passes through seven of the United States; that

it pushes as far north as Churchill on Hudson Bay—and to this might be added the fact that its steamships link Vancouver, Victoria, Seattle and the ports of Alaska, and connect the eastern ports of Montreal, Halifax, and Saint John, with Bermuda, the West Indies, South America, Australia, and New Zealand. There is no phase of Canada's material development that is not the concern of the National Railways System. It transports the products of the Dominion, from country to city, from city to city, and to the seaports for shipment to all parts of the world.

In the first place, it serves agriculture. It covers the old settled areas of Ontario and the multitudinous acres of the prairies like a network. It carries millions of bushels of grain out of the prairie provinces every year; it transports cattle from Alberta, fruits from Ontario, butter, eggs, poultry, and vegetables from the eastern provinces. It serves the farmer by carrying his produce away for him and by bringing to him from the manufacturing centres the things he needs. With its steel it has followed the pioneer farmer into the new, unbroken country; many times it has gone ahead of the pioneer and opened up the way for agriculture; particularly is this true in the northern territories where so much of the future of the country lies. Pioneering with its lines, the Canadian National System has, in the development of new country, discovered some of the richest mines in Canada —gold, silver, and copper in the far reaches of Northern Quebec, Northern Ontario, and Northern Manitoba. It is to the National System, which built it, that will be given the operation of the new railway to Churchill, Canada's newest seaport, which lies on the historic Hudson Bay. The coal mines of Alberta and British Columbia, in the West, and of the Maritime provinces, in the East; the oil wells of Alberta; the great fisheries of Prince Rupert and of the Atlantic Coast; the lumbering and pulpwood industries of both east and west; the farms where foxes are bred for fur and the towns where factories are busy—all are aided in their work by the railway.

The ramifications of the railway are many. To be the servant of agriculture, for example, involves much more than laying steel in new areas and keeping the farmer and his markets close together by a reliable, consistent service. It means, often, finding homes for farmers with money to invest and for immigrants from Europe; very often, it begins in Europe with a systematic training of prospective Canadian farmers in the methods of the new land. In the year 1929, the Canadian National Railways carried sixty per cent. of the immigrants who came to the country. Transporting the tides of immigrants to the sections of the country that need them most, and carrying the armies of harvesters, as well as the countless bushels of grain they thresh—all this is part of the labour of the system for agriculture.

So much for commerce and industry. There is another industry, however, which becomes more valuable to Canada as the years pass. In 1929, more than thirteen million tourists visited the Dominion. The "trade" in pleasure brought Canada in that year more than $300,000,000, as much as the Dominion's mineral output. The part the National Railways play in this highly remunerative business is large. Their lines, for example, lead into Jasper National Park in the Rockies; to Wainwright, where the bison are preserved; to Prince Albert National Park, in Northern Saskatchewan; to Algonquin Park, in Northern Ontario; to the Pacific Coast by two routes, the one, northward, through the Skeena River country, to Prince Rupert, and the other, along the Fraser to Vancouver. They tap the north not only for its minerals, timber, pulpwood and power and its potential grainfields, but for its lakes and streams and its woods, for the pleasures it gives the hunter and the fisherman. Three new steamships, built in the past winter at Birkenhead, were added this summer to the increasing trade along the Pacific Coast. As part of the service the Canadian National gives the traveller, whether for business or pleasure, fifteen hotels and summer "lodges" are either operated or are now under construction by the railway. Two of the most outstanding of these are the

Château Laurier at Ottawa and Jasper Park Lodge in the Rockies. Visitors from all parts of the world are guests each summer at Jasper Lodge, which, although it is equipped as a truly modern hotel and has one of finest golf courses on the continent, is built in a series of bungalows of native logs and stone, in keeping with the beauty of the surrounding mountains. The Canadian National line crosses the Rocky Mountains at the lowest altitude, yet in view of the most splendid mountain scenery, notably Mount Robson, the loftiest of the peaks.

To the world of science the National Railways has made many valuable contributions. It is a source of pride with us that where we have not taken the lead we have kept pace with the developments of railway operation in other countries. Considering the comfort and safety of passengers, the system has introduced many details in its all-steel trains that are unique or were unique until other railways saw their value. Sun-parlour cars with windows of "Vita" glass, which allows the full benefits of the sun's rays to reach the traveller, are among these. The Canadian National was the first railway in the world to install radio on its trains. Experiments were begun nearly thirty years ago on the old Grand Trunk Railway, and when the science of wireless came to flower the railway placed receiving apparatus on its principal trains. As a result, travellers may sit in the lounge cars or in their compartments and, as the train speeds across the prairies or through the forest, listen to music, stock quotations, or news bulletins broadcast from cities many miles away. Across the country, from sea to sea, the system maintains a series of thirteen broadcasting stations, and the Director of Radio arranges concerts in which the most distinguished native and visiting artists take part. A programme, originating in Montreal, for example, will be simultaneously broadcast from cities as far apart as Vancouver, on the Pacific coast, and Moncton, close to the Atlantic. In this way, with the co-operation of the British Broadcasting Company, the Marconi Company, and other organizations, were the speeches of King George V. and the other speakers at the naval disarmament con-

ference in London brought over the Atlantic and heard widespread across Canada. The installation of telephones on trains is one of the latest of the Canadian National Railways' contributions to science and to the convenience of the travelling public. The business man, hurrying from one city to another or on his way to the mountains for his summer vacation, may communicate directly with his office. Rapid progress has been made, too, in the development of the Canadian National Telegraphs. The "carrier current" system, which this department introduced into Canada, has made for an enormous saving in operating costs as well as for a remarkably increased speed and efficiency. Two copper wires, stretching between Montreal and Vancouver are sufficient, under this new system, to provide ten full duplicate Morse circuits, two composite Morse circuits, and a long distance telephone circuit. Another advantage in the carrier current line is that it is not subject to atmospheric disturbances as is the old method.

As a matter of statistics, the British Empire has few larger or more powerful locomotives to show than the "Northern" type, built in Canada for the National system. Designed for use in fast passenger and freight service, it can handle a train of twelve steel cars at a speed, when it is demanded, of 80 miles an hour. With its tender, the Northern weighs 329 tons. It is capable of developing more than 3,200 horse power. Anxious as they were to develop steam locomotion to its utmost of efficiency in the hard work the railways in Canada must do, our engineers have not been satisfied to give all their attention to steam. By inventing and perfecting the oil-electric engine, known as No. 9000, they have achieved a locomotive which some have gone so far as to say marks a new epoch in railway history. This may be an opinion, but it is a fact that No. 9000 has the advantages of speed and power and convenience of operation combined with radical economy. It weighs, fully equipped, 325 tons and is capable of a tractive effort of 100,000 pounds. Oil is used for fuel to drive the electric generator which turns the propulsion motors, and the fact that it

is smokeless has attracted the attention of such large centres as New York and Boston.

The Canadian National Steamships began as the Canadian Government Merchant Marine, and there are now in operation fifty-one vessels, including the five steamers which were put into operation to develop trade between Canada and the West Indies under the terms of the trade agreement between the Dominion and the Colonies. They ply between the ports of Montreal, Saint John, and Halifax, and Bermuda and the eastern and western groups of the West Indies, as far south as Demerara, bearing both freight and passengers. Other vessels carry freight between Canada, the West Indies, South America, Australia and New Zealand; and there are, including the three new ships, eight in the Pacific Coast service.

The employees of the Canadian National System, the partners in this widespread enterprise, have their recreational clubs, their organized sports and First Aid competitions—three First Aid instruction cars were put into operation early this year for the benefit of the men far removed from the centres of industry—and their monthly magazine. Through a co-operative scheme in effect in our shops, maintenance of way and bridge and building departments, the system has give its employees a voice in the management. Several thousand suggestions for betterment of methods and conditions, and for continuity of employment, have been made by the men, and last year 72 per cent. of these had been put into effect, while 15 per cent. are under consideration. As a result of our partnership movement, we have all our men devoting the best of their brains to help the management to do better than we did before. The outcome is a high morale impregnating the railway and a sense of pride and loyalty which makes every man, from the humblest worker to the officer with the greatest responsibility, anxious for the well-being and progress of his railway.

THE CANADIAN PACIFIC RAILWAY

By E. W. Beatty, K.C., LL.D.

President, Canadian Pacific Railway Company

THE construction of the Canadian Pacific Railway was an essential condition of the completion of the Canadian confederation of provinces. Without the railway Canada, as we know it, would probably never have been born and would certainly never have grown up.

In a wider sense, it is true, the project was the child of a fundamental instinct of those sturdy stocks which had already brought the embryonic country into existence. The daring that conquered the stern region north of Lake Superior, the thousand miles of uninhabited prairie, and finally the giant barrier of the Rockies themselves, was the legitimate offspring of the same spirit that had refused to be daunted by the rapids of the St. Lawrence or the forests of Ontario. Only the Pacific itself could stop the westward surge, not merely of a handful of pioneers, but of a whole people. But without the railway that impulse and that inspiration would have been abortive, or delayed for a generation. It made into a reality the thesis that all the land lying north of the forty-ninth parallel was, and was to remain, Canadian and British.

It is almost impossible to-day to realize how hopelessly divided the infant Canada was in a physical sense. Only by roundabout routes, for hundreds of miles through almost trackless wilderness, could the traveller cross the country on Canadian soil. If he insisted on travelling from Halifax to Vancouver under the British flag, the only way to do it was by taking ship and making the voyage round the Horn. West of the Great Lakes the eyes of the little settlement at Fort Garry turned naturally southward. Its trade was not with Eastern

Canada, and could not possibly be until the gap around Lake Superior was bridged. Between it and the handful of settlers on the Pacific stretched two thousand miles of prairie, held only by the Indian and the buffalo and that "sea of mountains" that was the Rockies. In 1869 the first tentacles of steel stretching eastward and westward across the United States met and locked into the first continuous railway line across the continent. The country along the line began to fill rapidly with settlers, and land-hungry people from the American West rolled northward, up to and across a boundary that —at least so it seemed—existed only in theory. The tiny hamlets that these settlers created, like Fort Garry, like Vancouver, maintained their contact with the outside world only through American territory. Unless someone should in Goldwin Smith's phrase "defy geography," Confederation was still-born. Canada could not wait—and remain Canada.

But who was to do it? There were more than 38,500,000 people in the United States before two railway systems linked up to form the first line across the country from ocean to ocean. Ten years later, when Canada faced the bigger undertaking of building the first really trans-continental line, there were only 4,500,000 people in the country. The Mackenzie government tried to carry out the work and failed after much effort and expenditure on a scale that the country could not afford. The Macdonald government that followed saw the futility of going on with construction as a public work and appealed to private enterprise. The experienced men that were running the only existing railway system of importance in the country, the Grand Trunk, would have nothing to do with the undertaking on the terms proposed. European capital shrank from so great a risk, so far from home and with so little apparent prospect of a return on the investment. There was a pause, and for a moment it seemed as though the line would never be built, or would be built too late for the truly national purpose for which it was intended.

And then the hour produced the man—or men. It was a group of outstanding courage and of genuine

patriotism. No longer young, past the first enthusiasms of youth, already wealthy, or at least within the reach of wealth and the leisure that comes with it, George Stephen, Duncan McIntyre, Richard B. Angus—to name only a part of the group—might have been excused if they had refused Macdonald's proposal that they should build the road. Few men of that day believed that the road could be built, or that, if it were, it would ever pay its builders. The government's efforts up to that time seemed to indicate that the expenditure required would be enormous. There were only 165,000 people west of the Great Lakes. Why should they embark on any such hare-brained project?

But embark upon it they did, luckily for Canada. Every Canadian school-boy knows the story of that heroic struggle against almost every known variety of natural obstacle, with what engineering and organizing skill the gigantic task was undertaken and carried out, how it was completed years before completion was thought possible, and how on November 7, 1885, a golden spike was driven at Craigellachie at that point in the Rocky Mountains where the line was officially finished. What we are only now coming to realize was that that golden spike did more than symbolize the completion of a tangible railway system of rails and rolling stock; it rivetted British North America into one homogeneous whole.

And from that day the Canadian Pacific Railway became more than a transportation system; it became a Canadian institution. It assumed a direction which it has never since relinquished. It became, almost overnight, a living force from which has been destined to radiate the energy and the inspiration that has brought the country's development to its present state.

It was by no means all plain sailing even after the line was built. Population had to be, so to speak, created where there was none before. Eastern Canada was by no means so crowded that the new west could draw upon it heavily. The Company had to go afield for settlers to people this new kingdom which was awaiting its opening up. And the Company went afield with the same

indomitable energy and resourcefulness which it had displayed in the building of the line. It did not long rest content with letting others gather its settlers overseas and deliver them in Canada. It went overseas for them and brought them back in its own ships, the nucleus of that great fleet that shows the chequered Canadian Pacific Railway houseflag on all the seven seas.

As the country opened up, the demands upon the railway became more and more great, and as the railway pushed out its steel feelers into newer and newer fields, more and more the country developed. To-day the slender single line has become a whole network of branches some of them almost little railway systems in their own right, a great gridiron of lines which year after year, in steadily growing volume and with ever-increasing efficiency, shuttle the commerce of Canada from east to west and from west to east, carrying too the exports of the country to tide-water, and supplying the connections which permit the rapid interchange of business with the United States. Nor is the "New North" neglected. What was a few years ago believed to be no more than a frozen waste for nearly all the year, has been found to be still another great granary in the making, capable of feeding a nation. Into this new region the Company's lines are already making their way. The saga of the building of Canada is not yet completed.

It is impossible to indicate the huge equipment which the Company must at all times maintain to furnish the service required of it without going deep into tabulated figures. It may, however, be noted in passing that the Canadian Pacific Railway now operates sixteen thousand miles of rail lines in Canada, twenty-four ocean steamers on the Atlantic and on the Pacific, and twenty-nine ships in the British Columbia coastal service, including smaller vessels on the Great Lakes and the lakes of British Columbia. It owns fifteen hotels and a chain of bungalow camps. It is actively interested in the ownership and operation of many other hostelries. It operates approximately 200,000 miles of telegraph lines. It carries two hundred thousand passengers across the Atlantic annu-

ally. It has moved more than two hundred and fifty millions of bushels of wheat in one year. It transports over thirteen millions of passengers in Canada yearly. The Company owns more than two thousand locomotives, some of the newest oil-burning type, which weigh with their tenders 375 tons and are the largest freight engines in the British Empire. There are three thousand passenger cars and more than ninety thousand freight cars. Of sleeping, dining, and café cars there are over six hundred, all built and operated by the Company.

But constantly laying mile upon mile of new lines in areas opening for development, building rolling stock, buying ocean vessels and erecting hotels is only a part of the Company's multiple activities in the extension of Canadian trade facilities. It has collected and collated an enormous mass of information about Canada from coast to coast. All this invaluable data is available, not only for its own purposes, but is held for the use of the public. Its publications and bulletins are as detailed and as accurate as those of any government and nearly as diverse. It maintains a most complete industrial department for the use of those who may contemplate establishing industrial enterprises of whatever kind in Canada. There is also a development department, the duty of which is to investigate Canadian natural resources, to encourage new uses of raw materials and crops.

Almost everywhere the fingers of this organization are on the pulse of the world. If you are at any important centre of population in Great Britain, on the Continent, in the near or far East, in the United States, in Australia, and you desire to know something about Canada, there is a representative of the Canadian Pacific Railway system there able and willing to meet your need. The cheerfulness and the courtesy with which he will place himself and his special knowledge at your service is typical of the whole enormous organization, with its more than ninety thousand employees. In their relations with the public members of the Canadian Pacific staff have been taught not to stop short at the bare fulfillment of their official duties.

But with all its varied activities the main business of the Canadian Pacific is to furnish transportation, and it throws into that work the very best that it has of skill and energy. It possesses trains that are not excelled anywhere in the world for luxury. To-day the traveller can cover the length of Canada surrounded in his moving home with practically every comfort or luxury that even the Company's hotels can furnish him. Speed must never take precedence of safety, but year by year the Atlantic and Pacific are drawn closer and closer together as the great new engines and road-bed improvement cut down the running time across the country.

And what a trip it is! There is scarcely a variety of scenery to be found on earth that will not be recognized by the world traveller as he gazes out of his window. From the quiet warmth of the rich red soil of the Maritimes to the charm of Old World Quebec, through the fat pastoral lands of Ontario and its humming cities, by the margins of innumerable lakes in the grim Superior country, across illimitable miles of the granary of half a world, through the breath-taking majesty of the Rockies and down their golden western slopes to the English air and the roses of Vancouver and Victoria—the most blasé traveller will get a score of new sensations of unforgettable loveliness. He will, moreover, understand something of the thrill that must have rewarded the pioneers as the map unrolls before his eyes. He will see for himself their dreams come true.

Everywhere he will find the Company's lines—"C. P. R. Service"—touching Canadian life at every point. There is nothing that Canada has to offer with which some phase of the Company's activities cannot put him in touch, whether it be in his mind to carry on business in one of the cities, to deal with agriculture, to investigate mines or oil or timber, to catch a salmon or a trout or to shoot a moose. All across the continent modern hotels, owned and operated by the Company, offer him all the service and all the luxury that older and perhaps more non-sophisticated civilizations may boast about. The new Royal York at Toronto is one of the

world's greatest hotels in every sense of the word. Banff and Lake Louise offer the last word in beauty of appointment amid surroundings unsurpassed in any country.

The ocean services of the Canadian Pacific have kept pace with—and on one ocean excelled—the famous lines whose names are household words. The mighty watergate of Canada, the St. Lawrence, giving the minimum of "blue water" sailing between North America and the Old World, is without compare in the beauty of approach to this continent. Up and down it in the summer the Company's boats pass and repass, a steadily increasing fleet. They offer every type of accommodation that may be desired, from *de luxe* suites for the millionaire on the huge *Empresses* to the less pretentious, but not less comfortable quarters on the smaller ships which are more and more in demand. For the fortunate ones whose luck it is to cross from Vancouver to the Orient, the Company offers vessels that have left all rivals in that part of the world behind. The great "white *Empresses*" are without peer on the Pacific and two others, even bigger and finer, are on the way. If he can—or must—content himself with a shorter trip, there are fine coastal steamers which will take him through the almost indescribable beauty of the west coast fiords to northern British Columbia and Alaska. If he would see something of the "new North" again, he may do so under the ægis of the Canadian Pacific, whose lines are feeling steadily northward into what was yesterday the "unknown" Peace River country.

It might almost go without saying that the voyager's incidental needs are cared for at every turn. His messages are forwarded by the Company's telegraph system. If he wishes it to do so, its Express Company will issue him travellers' cheques that so simplify one responsibility of travel. It will look after the quick and safe expedition of anything he wishes to entrust to it and deliver it for him, in the next town or at the other end of the world.

The financing of the Company through all these expanding years has been a most exacting task. At the outset the most rigid economy was essential. Every

last dollar was ear-marked for immediate expenditure. Revenues were slender, and money hard to come by, in the days when confidence in the venture was not widespread. But with the gradual settlement of the country the tide turned. Company lands—a drug in the market in the days when there were more buffaloes than Canadians along the line—began to acquire value and were wisely disposed of. Gradually the Company was enabled to turn to a profit some of the natural resources of the country that lay within its holdings. For many a long day the Canadian Pacific has been regarded in all the money markets of the world as "sound as the Bank of England." The securities of the system, about seven hundred and fifty millions in all, represent only a fraction of the value of the Company's property.

The common stock issue to the Company, amounting to three hundred and thirty-five million dollars has for long paid a ten per cent annual dividend. The directors have become satisfied of the desirability from many standpoints of placing the Company's ordinary shares within the reach of investors of moderate means as in view of the fact that over ninety-seven per cent of the Company's investments are in Canada, it would seem highly desirable that there should be a greater percentage of Canadian holders of the Company's stock. The par value of $100 a share will therefore be reduced to $25, Parliament having granted the requisite authority.

In the past ten years the Company has expended about three hundred and eighty-six million dollars on extensions and improvements. In the short period of two years it added eleven ships to its fleet. It has under advisement a huge programme of further development and extension. Having given length to Canada, it is setting its mind upon the problem of giving it breadth and its lines are pushing steadily northward toward the Arctic Circle.

Is it any wonder that Canadians have come to regard the Canadian Pacific as being—what was said at the beginning of this article—a national institution, rather than a railway company? It is closely woven into the national life of the country. It was the original frame-

work around which the infant nation clung, and adolescent Canada is still largely being shaped by its lines. It is no part of Canadian Pacific policy to become fixed and rigid with the passing of the years. It is the desire of the directors to retain for the Company the flexibility of its younger days and enthusiasm and receptivity to what is new and worthwhile that characterized the pioneers that put it through. The future of the country and of the Company seem inextricably involved, the one with the other; and both are bright.

THE OPENING OF THE HUDSON BAY ROUTE

By J. W. Dafoe, F.R.S.C.

Editor of the Manitoba Free Press

BY the summer of 1931 Western Canada will be brought one thousand miles nearer to Great Britain and Europe by the opening to commerce of the new northern route *via* Hudson Bay and the north Atlantic. The Hudson Bay Railway, government-owned, running from The Pas to Churchill, a distance of 510 miles, will give Western Canada access to the sea; and between Churchill and Liverpool there are only 2946 miles of sea. From Regina to Liverpool by way of Churchill there is a saving of about one thousand miles over the present route by way of Montreal and the St. Lawrence; and as one moves north or northeastward from Regina the advantage over the St. Lawrence route increases until at the present northern limits of agricultural production it amounts to 1300 miles. These figures supply the reason for the long-continued agitation for the opening up of this route, which, after many reverses and much hesitation on the part of the Canadian government, has been crowned with success. The railway reached Churchill on April 2, 1929, nearly nineteen years after the turning of the first sod at The Pas in September, 1910; but the actual opening of the route to commerce must await the construction of docks, the dredging of the harbour, the erection of aids to commerce along the sea-route, and the building at Churchill of trade-handling facilities. There is, however, already a thin trickle of trade flowing over the route. Thus in September, 1929, the Hudson's Bay Company, to signalize the completion of the railway, shipped from Churchill 1800 bushels of wheat to Great Britain, and brought in a consignment

of blankets for its stores in Western Canada. There will also be henceforth a considerable movement of supplies, required by the work by sea and land; but the formal opening of this transportation channel for general business must await the completion of arrangements now being made.

In one sense, it is absurd to speak of this as a new route, since what is in prospect is in reality the re-opening of an ocean highway which, for two and a half centuries, was sailed every season by British ships and had during all this period a virtual monopoly of the trade between Great Britain and the territories now known as Western Canada. Two years after Champlain founded Quebec, Henry Hudson was in Hudson Bay in his little cockle-shell of fifty-three tons; and from that time forward England was conscious that her destiny called her to the task of holding the Bay as a starting-point for conquest in trade and exploration. For nearly fifty years there was war for its possession, sometimes private and at other times formal, with France, and around these shores there were battle, murder, and sudden death—naval engagements, sieges, stormings, surprises by night. The fort at the mouth of the Nelson, variously named, changed hands over half-a-dozen times while the contest continued. The strategic possibilities of the Bay, which are only now being rediscovered, were clearly realized, two and a half centuries ago, by these warring nations. The widely-held idea of the Bay as a great desolate, dangerous waste of water, to be shunned by mankind, had no lodgment in the mind of the sailors and traders of the seventeenth century. They sailed their little ships into the Bay with no sense that there was anything exceptionally dangerous about it. Radisson, one of the *voyageurs* of the Hudson's Bay Company, year after year set sail for the Bay every spring, traded along its shores, and returned in the autumn to London. To him and to others it was just a matter of routine. To illustrate this one or two historical incidents may be cited. In 1682 Radisson, having abandoned the Hudson's Bay Company and returned to New France, decided to go into the Bay on a fur-gathering

adventure. He set out from Quebec in two ships, the largest of fifty tons. Arriving at the mouth of the Nelson he found there another ship, sailed by a poacher from Boston. Shortly afterwards a fourth ship turned up, the official Hudson's Bay Company ship with the governor on board. Though the two countries were at peace, private war broke out. The energetic and resourceful Radisson triumphed; and he sailed back to France in a captured British ship, with the governor in the hold. In 1694 again, a naval force of two vessels left Quebec in August, voyaged to Nelson, carried on a successful three weeks' siege of the fort, and got out of the Bay before winter set in. In 1697, five French warships in the Straits found themselves pursued by five British warships. A few days later, one of the most desperate naval engagements every fought took place at the mouth of the Nelson, victory going to the French through the sinking, with all hands, of the British flagship. Thus it will be seen that, whether for trade or fighting, the Straits were open water for the ships of France and England.

Following the cession of the disputed territory to Great Britain the very considerable trading needs of this vast area were served by ships plying between England and the Hudson's Bay Company's ports. When Lord Selkirk embarked at the beginning of last century upon his enterprise of establishing colonies in the interior of this territory to take care of the surplus population of Great Britain, the route to the promised land was by the northern waters and Hudson Bay. Lord Selkirk had a great vision. "It is a very moderate calculation," he wrote, "to say that if these regions were occupied by an industrious population they might afford ample means of subsistence to more than thirty millions of British subjects." There was at that time no suggestion that there was any particular difficulty or danger in establishing communications by sea with Western Canada. That idea came later after alternative and more readily accessible avenues of communication had been established. By the sixties of last century an overland route by way of Chicago and St. Paul had been opened up; and some-

what later railway communication was established, first by way of the United States, and then by Canadian transcontinental roads. The Hudson Bay route was abandoned except for the occasional visit of a Hudson's Bay Company trading ship; and knowledge of it faded from the public memory. When in the eighties the project of re-opening the route by the building of a railway to Hudson Bay was put forward, there was opposition on the ground that the scheme was visionary and wholly impracticable. The controversy has been bitter and prolonged; and it is only now, after fifty years, that effect has been given to the steady and persistent demand by Western Canada for direct access to the sea. But the attitude of doubt and hostility by large sections of the Canadian public has not been wholly removed by the government's decision that the road should be completed and the route opened. Until its usefulness and availability are established by experience, the Hudson Bay route will be regarded by its critics as an experiment. Hence the very special precautions that are being taken to ensure that the initial operation of the route shall not take place until everything is ready for the test.

The case for the route may be briefly stated. Churchill is as near to Liverpool as Montreal is; and it is from a thousand to 1300 miles nearer the central area of Western Canada. Wheat originating in this area can reach Churchill by rail as soon as it can reach Fort William or Port Arthur at the head of the Great Lakes; it will then be ready for shipment by sea whereas wheat after reaching the head of the lakes has still a thousand miles of lake and river to traverse before it can reach the sea-port of Montreal. Wheat by the northern route will thus save ten days' time, which it takes wheat to go from Fort William to Montreal, and will save also the transportation charge of about ten cents a bushel. If the ocean rate from Churchill to Liverpool corresponds with the rate from Montreal, the cost of carrying wheat from the farm to the world's markets will thus be cut by ten cents a bushel. If these calculations are correct, the advantage of the new route will be so great that the northern route

will be taxed to its capacity in carrying grain during the season of navigation. To the extent that they can employ the route the farmers of Western Canada will enjoy a preferential position over users of the alternative routes. It thus becomes a matter of importance to determine the limits of the season during which the route can be operated.

The special committee of the Canadian Senate which in 1920 enquired into the practicability of the Hudson Bay route found that "the season of navigation under present conditions is at least four months in length and may by reason of improvements in aids to navigation be considerably increased." The period of navigation which the committee had in mind corresponds closely to the months of July, August, September, and October. The date at which navigation will close will not be definitely known until the route is put to actual test. The port at Churchill is open in ordinary seasons until the middle of November and could probably be kept open to a much later period by ice-breakers. Ice conditions in Hudson Straits, a great seaway five hundred miles long and from thirty to over a hundred miles in width, will prove the controlling factor. In 1928 the Straits were not blocked with ice at their western extremity until well on in November; but that season is thought to have been exceptional. With market conditions as they have been in recent years the route could be employed for the whole period of navigation in carrying wheat—for the first six weeks in moving the carry-over from the preceding season, and for the remainder of the period in carrying the new crop. With the employment of the "combine" in harvesting, wheat begins to find its way into the elevators as soon as the crop is cut; and there seems to be no reason why there should be any limitation of the volume which will move out through the Bay beyond that fixed by the capacity of the railway, the transfer facilities at the docks, or the available tonnage. Critics of the route suggest that ordinary tramp steamers will not risk voyaging in these northern waters, and thus the employment of specially built ships will be necessary; but this objection is not seriously regarded. More attention is paid to

another objection, that the route will be penalized by very high insurance rates—in which event the government will be strongly urged by Western Canada to bring in its long-promised plan of government marine insurance.

The firmly held belief in its usefulness for the carriage of grain has been responsible for the development of the route; but if its success in this respect is established there will be no lack of freight of the most diversified character. It is possible that it will revive the cattle trade between Canada and Great Britain which has now ceased owing to inability to land the cattle at prices that will make it possible to sell them. A comparatively short rail haul to the sea with a cool sea-voyage through northern latitudes to British ports may again make the shipment of live cattle from the farms of Western Canada possible. The output of the base metal mines of Northern Manitoba, two of which will be in production in the early future, will naturally seek their European markets by the northern route; and one can foresee a steady outward flow of natural and partially manufactured products of Western Canada, including lumber, furs, and newsprint. Outward freight rates will be affected by the extent to which there will be return cargoes; and possibilities in this connection are developing. It is estimated that Welsh bituminous coal will have an advantage in price over domestic coal for five hundred miles from the sea, and in this area there will be in the future a large mining and a considerable industrial development. Welsh anthracite coal may find a market in Winnipeg and other western cities. Whatever the advantages of the new route, with respect to time and to the saving of carrying charges, they will be available to the British exporters who supply goods for consumption in Western Canada. Access to the Winnipeg market, where there is a large sale already for British goods, can be made still cheaper by the construction of a line northward from the city to join the Hudson Bay road, by which means some two hundred miles can be cut from the railway mileage between Winnipeg and the sea. Projects to this end are now being considered.

The prospect of a new shifting of the geographical relationship between the northern part of the North American continent and Europe comparable in some measure to the transformation which followed the opening of the Panama canal is making a powerful appeal to the imagination of all those engaged or interested in trade. The successful operation of the route cannot but have great consequences—some obvious, others not yet foreseen. The territory affected by the thousand-mile shortening of distance to Europe includes not only Western Canada but the adjoining states of the American union as well. It must also be borne in mind that this gives, in season, an alternative and shorter route from Great Britain to the Orient; and this route is certain to be still further shortened by the construction, which can now be readily foreseen, of a railway line from Churchill direct to the Pacific by way of the Peace River country. The curtain is about to go up on another act in the great drama of transportation.

CIVIL AVIATION IN CANADA

By J. A. Wilson

Controller of Civil Aviation, Ottawa

IN Canada conditions have been favourable during the past ten years for the development of aviation on a sound and self-sustaining basis. Three-fourths of the area of the Dominion is still unserved by roads or railways. The greater part of this undeveloped area is covered by the Precambrian shield and is, therefore, a potential storehouse of mineral wealth. Its forests are the sole reserve still unexploited for the industries dependent on them. Through it flow some of the great rivers of the world, on which may be developed many million horsepower of hydro-electric energy. In it are many areas suitable for farming still unsettled, and still greater grazing lands. Its fisheries have an enormous future, and for centuries it has been one of the chief fur-producing districts of the world.

After the Great War, the people of Canada set themselves the task of rolling back their northern frontier and doubling at least the productive areas of the Dominion. Better means of transportation were the first need. Distance was great in the Canadian north till the advent of the aeroplane, and the sole means of transport over many hundreds of thousands of square miles was by foot, by canoe or pack train, or in the winter by dog team.

Successive governments, both provincial and Dominion, realizing the possibilities of aircraft in solving the problem of transport in the North have lent their aid in the organization of flying services to facilitate travel, observation, and transport. Progress was slow for the first two or three years. The war types of aircraft were not suited to this very different field of endeavour. Funds were scarce and public opinion apathetic. Those interested

in the administration of the northern areas and exploration and development, however, strongly supported the efforts of the flying services in their endeavour to adapt the new form of transportation to the very different conditions existing in the north. Gradually new types of aircraft more suited for Canadian use have been produced to meet the requirements of the northern operators. Bases and caches have been established each year further afield, from which operations may be conducted. An efficient operating staff has gradually been built up and knit into a sound organization by the stern conditions it has been called on to meet.

The northern half of the American continent is a network of waterways, a paradise for the seaplane where the land plane has no place. This was fortunate since, without these ready-made landing places, this development could not have been undertaken. The expense of creating aerodromes would have made it impossible. In winter the ice-covered lakes and rivers make perfect aerodromes for landings on ski. A few months after the Armistice was signed plans were perfected for trials of flying boats over the northern forest. The Dominion government, the Forest Service of the province of Quebec, and one of the large pulp and paper companies shared the expense.

These experimental flights in 1919 were successful and led to the establishment in 1920 and 1921 of operating units in Quebec, Ontario, Manitoba, and British Columbia to aid in the administration and protection against fire of the forests. The provincial governments lent generous aid in establishing bases and the flying was carried out with the hearty co-operation of the forest services.

By the end of 1922 the success of the new venture was well established. In 1923 the provinces took over the organization of their own flying operations, and the Dominion government has since concentrated its effort in the building up of an efficient air organization for its own requirements. Each year has seen an expansion of the service to meet new demands for air operations. The ground organization has been perfected by the building of permanent bases for the repair and maintenance of

aircraft, the laying of gas caches all through the territory served, the introduction of wireless improved communications, and the construction of new types of aircraft specially adapted to Canadian conditions.

From the few improvised bases established in the early years from which were operated a few old H.S. 2L and F3 boats on forest protection work, the Service has grown to cover all northern Canada and serves not only for its forest protection but a great variety of other useful work as well.

The Civil Government Operations Branch under the Department of National Defence now maintains:

Civil Government Operations

Number of officers	74
" " airmen	249
" " aircraft	86
" " central depot	1
" " main stations	3
" " sub-bases	11
" " caches	120
" " wireless stations	15
" " photographic detachments	8

Area patrolled—approximately 100,000,000 acres in Manitoba, Saskatchewan and Alberta.

Area photographed, 1927	46,000	square miles
" " 1928	64,400	" "
" " 1929	74,000	" "

Total area photographed over 400,000 square miles to date.

Flying time, 1927	3,471	hours
" " 1928	9,002	"
" " 1929	11,560	"

The work includes forest protection, exploration and surveys, transportation of men and supplies for survey parties, payment of Indian treaty money, air photography, crop and forest dusting, fishery patrols, air mail, investigation, and experimental services. It is not too much to say that every government service interested in the administration, conservation, and development of Canada now makes use of aircraft as a normal part of work. This service, though it cannot, in the circumstances, return an actual cash dividend to the government

OTTAWA FROM THE AIR

By Courtesy of the Royal Canadian Air Force

for services received, is self-sustaining in every sense of the word because the services which use it find it efficient and cannot well do without it. An instance of this may be cited. The last summer has been one of high fire hazard. Large losses have been sustained, but the Forest Service have always been able to keep the situation in control, maintain their fire-fighting organization in good order and concentrate their efforts on the area of greatest value and highest hazard. Without aircraft this would have been impossible. The forest rangers now know from day to day what the situation is and what their losses are. Formerly they worked in the dark, because of the lack of good communications which the air services now supply.

The Provincial Air Service of Ontario, formed in 1923 as a branch of the Department of Lands and Forests, now has functions similar to those of the Dominion Civil Government Air Operations Service and does a great variety of useful work all through the northern districts of Ontario. It maintains 4 service stations and 10 sub-bases, 30 commercial pilots, 27 air engineers and 25 aircraft. The growing demand for its assistance is reflected in the record of flying time:

1924	2,595 hours
1925	2,740 "
1926	3,540 "
1927	4,561 "
1928	6,227 "
1929	11,602 "

The provinces of Quebec and British Columbia have also used aircraft in the same way, though their method has been different. No provincial air services have been formed, but the flying required has been purchased from commercial operators who supply the aircraft and personnel. Each year sees an increase in the number and variety of the operations carried out in both provinces, and their support has been invaluable in assisting the establishment of independent air service companies

for transportation of supplies, forest protection, exploration and inventory work, air photography, fishery patrols, and many other miscellaneous services.

The success of the government operations for forest protection soon led to the organization of commercial firms for transportation work in the north. The great mineral finds in northern Quebec, Ontario, and Manitoba gave a great impulse to prospecting all through the country. The new mining camps were far from the railways, and the aircraft operators found an immediate demand for their aircraft. The early services were not completely successful, because of the unsuitability of the available aircraft, but as new types of seaplanes, built to meet the requirements of northern services, powered with air-cooled engines, became available, the efficiency of the services increased. To-day travel by air throughout northern Canada is accepted as quite normal, and everyone who can afford to use the air service gladly does so.

The saving of time is immense. Journeys which formerly meant days, weeks, or months, and sometimes even years of strenuous manual labour are now performed in a few hours with comfort, ease, and safety. Fuel caches have been laid down along the coasts and the great river basins by steamer during the short summer season of navigation, and no district in Canada, however inaccessible, is beyond one day's or at the most two days' travel by air. This is true, not only in summer, but also in winter. The only close seasons are when the ice is forming or breaking up.

Several of the large mineral exploration companies have organized their own flying services. Northern Aerial Minerals Exploration and Dominion Explorers are leaders in this field. The Consolidated Mining and Smelting Company maintain their own aircraft. Leaders in the air service field were Canadian Airways in eastern Canada, and Western Canada Airways, which started in 1927 with a single aircraft. This company now owns

thirty-three planes of the latest types, and is prepared to take passengers or freight to any point in the country. The following figures show its activities:

	Flying Time hours	*Passengers*	*Freight* lbs.	*Mail* lbs.	*Mileage*
1928.....	6,780	9,647	1,192,057	122,170	545,009
1929.....	9,013	12,394	1,661,585	267,605	778,090

These commercial developments are unique in that they depend on no state subsidy or subvention. They operate wholly on their own revenues. Operating conditions are strenuous. Aircraft go out from their depots in the spring and stay out without shelter the whole season. Between overhauls they never see a hangar. Most of the flying is still from improvised bases on the banks of remote lakes or rivers, and it is only at the main bases that slipways and machine shops have been provided.

For winter flying in the far north, the nose hangar—a peculiarly Canadian institution—was invented for overhaul of engines in sub-zero weather. It is a small wooden or canvas shed open in front, into which the nose of the aircraft may be pushed. Canvas curtains are then drawn tight around the fuselage behind the engine, which gives an enclosed space in which a small stove may be lighted and a reasonable temperature maintained. In extreme circumstances such hangars have been built out of snow blocks with the aid of friendly Eskimos.

Many thousands of hours of flying have been done during the past six years in the far north. Many of the pilots have records which, if made in the full glare of publicity, would have made them famous. In the north they are part of the ordinary day's work and excite little public attention. They are fitting successors to many generations of gentlemen adventurers in the North reaching back to Frobisher, Hudson, and Davis.

It was not till 1927 that any attempt was made to organize regular lines for air traffic between the principal cities. The success of such services in the United States and Europe and the growing public confidence in aviation

brought about by the success of the northern operations, has made it possible for the government to institute, during the past two years, many regular air mail services. The first air mails served remote districts to which the existing mail services were slow and uncertain. Contracts were let for mail services to points on the shores of the Gulf of St. Lawrence, to the Magdalen Islands, to Anticosti, in the Yukon and Mackenzie valleys, and to many of the newly formed mining towns in the north. Such services have been fully justified, and the benefit they bring to these remote communities cannot be exaggerated.

To hasten British incoming and outgoing mails was the next step. These are now put ashore at Rimouski and flown to Montreal, Ottawa, and Toronto, and from these places to Rimouski to catch the outgoing steamers. In October, 1928, daily air mails were instituted by contract with the Post Office Department, between Montreal and New York, and Montreal and Toronto. The latter route was extended to Windsor and Detroit in July, 1929. Mails by these services can be delivered in Chicago before the steamer which brings them docks in Quebec. What this may mean to the future of the St. Lawrence route is obvious. A daily air mail connecting Toronto and Buffalo is also operated.

The volume of mail conveyed by air has risen from 14,684 pounds in 1927 to 316,631 pounds in 1928, and during 1929 approximately 430,636 pounds have been carried.

A contract has been let, and the service began in March, 1930, for the carriage of mails by night from Winnipeg to Calgary and Edmonton. This overnight service means a saving of twenty-four hours not only for these towns, but for transcontinental mails as well, since they can be taken from the train at Winnipeg and be put on board the previous day's train at Calgary.

The preparation of the airway for night flying involves much work. Intermediate aerodromes spaced thirty

A FOREST FIRE

PHOTOGRAPHIC SURVEY: AIRCRAFT IN FLIGHT

miles apart are being leased, beacons established, and a radio direction-finding system organized as aids to night flying by the Department of National Defence.

The interest and assistance given by the government does not stop with "heavier than air" services. An air-ship base has been established near Montreal, and a mooring tower has been built and equipped to assist in the plans for improved Empire communications by air-ship.

Another feature of Canadian aviation is the enthusiasm which the Flying Club movement has evoked. The department of National Defence has fathered the movement, and gives generous assistance by lending light aircraft to the clubs and paying a bonus for every pilot they train.

The following figures show flying club activities:

	Number of Members	*Flying Time*	*Ab initio Soloists*	*Licenses Obtained*	
				Private	*Commercial*
		hours			
1928.....	2,403	8,124	209	111	28
1929.....	5,095	15,600	401	172	57

An aviation industry is now springing up in the Dominion. Canadian Vickers were the pioneers, and now a number of firms are established. The possibilities of the Canadian market have not, unfortunately, been taken advantage of by British manufacturers to any great extent. The Armstrong Siddeley and De Havilland Companies are notable exceptions, and the latter's "Moth" may be found wherever there is flying to be done, on ski, or floats, or on wheels.

If we look back over the last ten years, there is no reason to be disappointed with progress. The extent of the development may not be very large, but for variety and diversity it is unequalled anywhere. Its practical nature and the support which it has received from every quarter is the best evidence of its usefulness.

The following statistics show its present rapid growth:

	1926	*1927*	*1928*	*1929*
Operating Firms	14	20	53	95
Hours Flown	5,860	12,070	43,071	78,000
Passengers Carried	6,436	18,932	74,669	120,000
Passenger Miles	631,715	1,424,031	2,883,782	4,000,000
Freight Carried (Pounds)	724,721	1,098,346	2,404,682	3,893,000
Mail (Pounds)	3,960	14,684	313,631	430,636
Licensed Air Harbours	34	36	44	68
Licensed Aircraft (In Force, Dec. 31st)	44	67	264	409
Licensed Pilots (Commercial) (In Force, Dec. 31st)	38	72	250	334
Licensed Pilots (Private) (In Force, Dec. 31st)	9	9	148	341
Licensed Air Engineers	65	74	200	305

(The above figures include Commercial Operating Companies, the Ontario Provincial Air Service and Light Aeroplane Club.)

POPULATION AND IMMIGRATION

By R. H. Coats, F.S.S., F.R.S.C.

Dominion Statistician

CANADA'S population to-day is estimated at roughly 9,900,000; when the census of June, 1931, comes to be counted, it may or may not exceed the ten million mark. This is a rise in ten years of about 14 per cent., *i.e.*, from 8,788,483, the figure of the 1921 census. The rate represents a slowing down from a 21 per cent. gain in the decade 1911-21, which in turn was a drop from a 35 per cent. rate of progress in the opening decade of the century.

To sketch very briefly the history of Canada's growth in population: Canada's first census, that of 1665, showed a population of 3,215 for the little colony of New France—mostly recently arrived immigrants. There was a further inflow of 4,000-5,000 from France during the next five years, which constituted practically alone the basis of all subsequent growth of the French population on this continent. Almost immediately thereafter, the European wars of Louis XIV by their demand on man power made immigration out of the question. From about 1670 the French population thus founded has doubled itself regularly every twenty-seven years since, till it reckons to-day a total well over four millions between Canada and the United States.

The United Empire Loyalists were the next considerable accretion to Canadian population from the outside (1783). The Loyalists founded the provinces of Ontario and New Brunswick, and re-constituted Nova Scotia. With their settlement Canada began the nineteenth century with a population of 250,000 or 260,000. This advanced to 2,384,000 in 1851 and to 3,689,257 in 1871 (the first census after Confederation). With the exception of a period of intense expansion during the 1850's

when the first Canadian railway system was under construction, growth during this period was slow and fitful. These were the years *par excellence* of the United States, when the great Republic was entering into possession of its magnificent middle and further west, when its population rose at the astounding rate of 35 per cent. in six succeeding decades. Against a magnet of such drawing power Canada had only the hard-wood bush of Ontario and the Eastern Provinces to offer; the "pre-Cambrian Shield"—a thousand miles of rock and muskeg—lay between the old provinces and the Canadian prairies. Not until saturation began to appear in the American west could the Canadian prairies come into the picture of growth. The building of the Canadian Pacific Railway was the first symptom of the latter, but by 1900 the opening of the "last best West" was fully under way and population began to go forward by leaps and bounds.

POPULATION OF CANADA, 1891-1929

Provinces	*1891*	*1901*	*1911*	*1921*	*1929 (Estimated)*
Prince Edward Island	109,078	103,259	93,728	88,615	86,100
Nova Scotia	450,396	459,574	492,338	523,837	550,400
New Brunswick	321,263	331,120	351,889	387,876	419,300
Quebec	1,488,535	1,648,898	2,003,232	2,361,199	2,690,400
Ontario	2,114,321	2,182,947	2,523,274	2,933,662	3,271,300
Manitoba	152,506	255,211	455,614	610,118	663,200
Saskatchewan	.....	91,279	492,432	757,510	866,700
Alberta	.....	73,022	374,663	588,454	646,000
British Columbia	98,173	178,657	392,480	524,582	591,000
Yukon	.....	27,219	8,512	4,157	3,000
Northwest Territories	98,967	20,129	18,481	7,988	9,400
Total	4,833,239	5,371,315	7,206,643	8,788,483	9,796,800

The present century, therefore, has witnessed the most rapid periods of Canadian growth. In the first decade, the increase for the first time touched that of the United States in its heyday, namely 35 per cent. immigration reaching its "peak" in 1913 with 402,432. This, it may

be remarked, was the most rapid rate of progress reported in any country during 1900-1910. The decade of the war saw the rate drop to 21 per cent., which was again the most rapid recorded, except in Australia. In the decade now ending there has been a resumption of expansion, but the main impetus has come from a new quarter. The pre-Cambrian Shield, long the barrier to Canadian progress has come into heavy bearing as a source of mineral, pulp, and water-power. As wheat characteristically became the leading export of Canada in the early years of the century, newsprint has forged to second place since 1921. Immigration from 1900 to 1912 centred upon the vacant lands of the prairies, with the railway building and industrialism contingent upon their opening up; latterly it has both declined in volume (1928 with 151,597 arrivals has the highest record since the war) and of necessity altered in character; agriculture is no longer the sole corner-stone of Canadian growth in population.

There are innumerable points of interest in the population content of a young and expanding country with the rich historic background which is Canada's. Only a few of these may be mentioned here:

In 1871 less than 3 per cent. of the Canadian population dwelt west of the Great Lakes. To-day the proportion is 28 per cent.—2,500,000 people compared with 110,000.

Race and language are powerful factors in Canada, with its two great national groups and two official languages founded on the capitulation of 1760, as well as its problem of the assimilation of the foreign elements introduced during the past half century. The British stocks (meaning those of English, Scotch, Irish, or Welsh descent) are still 55 per cent. of the population, and the French 28 per cent. (they were 61 per cent. and 31 per cent., respectively, at Confederation), but those of alien origin have risen to 17 from 12 per cent. in 1900 (they were only 8 per cent. at Confederation). The chief pre-Confederation infiltration was German; later, the most notable movements have been from Scandinavia, Russia, and Austria, with Hebrews in the larger cities. To discuss

the incidence and implications of this movement is beyond possibility here, though it is one of the most important of Canadian problems.

Only 15 per cent. of the people of Canada are unable to speak English, the dominant language. Of those of French descent, over a half speak both English and French, while a half speak French alone. There are, however, some 20,000 French who speak English alone, and 4,600 British (descendants of early settlers in Quebec) who speak French alone.

The average Canadian family is 4.96 or about one member smaller than at Confederation.

The Canadian population is of high masculinity (proportion of males to females), as is to be expected where immigration plays so large a part,—though the war, by checking immigration and by its toll of male lives, considerably reduced the excess of males. The present figure is 515 males to 485 females in each 1,000 of the population.

The varying birthrate in different sections of the country has resulted in variations in the median age, which has bred important social and economic reactions. The population of Quebec, for example, has a median age of 20.79, whereas that of Ontario is 26.76. Montreal is larger by 100,000 than Toronto, but the difference lies in persons under 30 years of age, two-thirds of it in children under 15.

A feature in the Canadian population that has given rise to much comment is the increasing tendency to urbanization. Fifty years ago only 18 per cent. of the Canadian population lived in cities, towns, and villages. To-day the proportion is 50 per cent. The past twenty years have seen an intensification of the tendency, a tendency on the face of it anomalous in a country where agriculture has played so large a part in development. Among the urban centres it is the largest cities that are growing the fastest. Toronto and Montreal together contain nearly 13 per cent. of the population, though this is small beside the 19 per cent. of Buenos Aires in

Argentine, and the 30 per cent. of Melbourne and Sydney in Australia.

Quo vadis? It is interesting to speculate on future growth. Canada is half a continent, potentially rich, still largely unsubdued to the use of man. Its filling up to a much greater degree than at present may be considered only a matter of time. Projecting the curves which fit best the observed growth of the several provinces from the earliest times, a total population of about 16 millions is shown within the next twenty years. Needless to say such calculations have a mere *interêt de curiosité*. It is safer, as first said, to pin one's faith broadly on such items as the 150 million acres of unoccupied farm lands, timber reserves which are the second largest of the world, the 16 per cent. of the world's known coal reserves, the second-best fishing grounds of the globe, and the 35 millions of undeveloped horse-power, all of which are Canada's, in justifying a forward-looking attitude on the part of all concerned in the Canadian future.

CANADA'S FOREIGN TRADE

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CANADA, as is natural in a country which is still in a state of vigorous economic development, where population is small and natural resources still unexploited, is dependent to a major degree upon her foreign trade. In the year 1928, the last for which comparable statistics are available, Canada occupied fifth position among the nations in import and export trade, as well as in aggregate trade; second place in export and total trade per capita; third position in favourable trade balance; and second place in favourable trade balance per capita.

In 1928 her total trade amounted to $2,596,564,000; of which imports accounted for $1,222,318,000, and exports $1,374,246,000. With an estimated population of 9,658,000 in 1928, the per capita trade of Canada amounted to $268. The only other country in the world with a higher per capita trade is New Zealand, with over $300.

Distribution of Foreign Trade

A consideration of very great importance, especially at the present time when the whole problem of trade within the British Empire is being considered with such acute interest, is the distribution of Canada's foreign trade. A careful survey of the records for the past thirty-four years reveals the somewhat disconcerting fact that while Canada's trade with the United Kingdom is steadily increasing, yet relative to her trade with other countries it is as steadily decreasing. The following table exhibits the percentages of her trade with the United Kingdom, other parts of the Empire, the United States, and other foreign countries.

DESTINATION OF CANADIAN EXPORTS

Year	United Kingdom	Other British Empire	United States	Other Foreign Countries
1896	57.1	3.7	34.1	4.7
1906	54.1	4.6	35.5	5.8
1914	49.8	5.4	37.9	6.8
1922	40.4	6.3	39.5	13.8
1928	33.0	7.3	36.6	23.1
1929	24.6	8.8	44.3	22.3

1896-1922, fiscal years ending March 31; 1928-29, calendar years.

From the point of view of imperial trade, it must be candidly admitted that the foregoing figures are disquieting. The drop in the proportion of Canadian exports going to the United Kingdom has been continuous, and for the last fifteen years it has been accelerated. It must, however, be pointed out that the year 1929 was abnormal in the heavy falling off in the amount of wheat sold to Great Britain. On the other hand, there has been a steady rise in the proportion going to other parts of the Empire, and while it is still small, at least it is steadily rising. The most remarkable change has been in the proportion going to foreign countries other than the United States, which has risen almost five times in thirty-four years.

SOURCE OF CANADIAN IMPORTS

Year	United Kingdom	Other British Empire	United States	Other Foreign Countries
1896	31.1	2.2	50.8	15.8
1906	24.4	5.1	59.6	10.9
1914	21.3	3.6	64.0	11.0
1922	15.7	4.3	69.0	11.0
1928	15.6	5.2	67.6	11.6
1929	15.0	4.8	68.7	11.5

1896-1922, fiscal years ending March 31; 1928-29, calendar years.

Here again we find some remarkable trends. The proportion of imports coming from the United Kingdom has been more than halved in thirty-four years, while that from the other parts of the Empire has remained fairly constant. The proportion coming from the United

States has risen, while that from other foreign countries has not varied greatly. The close proximity of the United States, similarity of tastes and modes of life, make it inevitable that Canada should find there not only her best customer, but also her principal source of imports. It would not be wholly fair to infer from the foregoing that Canada is steadily losing her appreciation of British commodities. In many ways this is growing, and Great Britain still holds an enviable reputation for excellence in her products. There is still, and always will be, we may believe, a strong sympathetic feeling towards British-made goods; but the influence of American business methods, and above all of American advertising, now intensified by the radio, is overwhelming, and the proportion of Canadian trade going to the United States steadily rises.

Raw Materials and Manufactured Goods

As would be naturally expected in a country which is still building up her manufactures, the import of manufactured goods into Canada and the export of raw materials, although slowly changing is still very large. From 1910 to 1928 the percentage of imports of raw materials into Canada increased from 24.2 to 25.6 per cent. of the total imports, and exports of raw materials decreased from 51.2 to 47.2 per cent. of the total exports. At the same time the percentage of imports of fully manufactured goods decreased from 65.8 to 64.8, and exports of fully manufactured goods increased from 32.7 to 37.4 per cent. of all exports. Of Canada's imports from the United Kingdom in 1928, 88.1 per cent. were fully manufactured, 7.3 per cent. were raw materials, and 4.6 per cent. were semi-manufactured. On the other hand, of Canada's exports to the United Kingdom, 71.4 per cent. were raw materials; 23.1 per cent. were fully manufactured goods; and 5.5 per cent. were semi-manufactured. When any scheme for imperial free trade is under consideration this aspect of Canada's foreign trade will have to be taken into account. Raw materials for manufacture enter either free or at a low rate; fully manufactured

goods are generally highly taxed. Canada would therefore be asked to lower her tariffs on fully manufactured goods in exchange for what would probably be a very small advantage for her raw materials entering Great Britain.

Trade of Canada with the Empire

The following table exhibits the imports and exports of Canada during the year 1929 with other parts of the Empire.

	Imports From	*Exports To*
United Kingdom	$194,776,000	$290,389,000
New Zealand	14,987,000	20,407,000
Australia	3,519,000	19,125,000
British India	9,485,000	9,470,000
Newfoundland	2,486,000	11,713,000
British South Africa	843,000	12,777,000
Jamaica	5,564,000	5,310,000
Trinidad and Tobago	2,949,000	4,095,000
Barbados	4,702,000	1,431,000
British West Indies, Other	1,271,000	4,723,000
British Guiana	4,265,000	1,774,000
Fiji	3,386,000	411,000
Hong Kong	1,272,000	2,457,000
All Others	7,810,000	11,399,000
British Empire	$257,315,000	$395,481,000

Analysing these figures into their three classes of United Kingdom, Dominions, including India, and Crown Colonies, we arrive at the following:—

	Imports From	*Exports To*
United Kingdom	$194,776,000	$290,389,000
Dominions	31,320,000	73,492,000
Crown Colonies	31,219,000	31,600,000
	$257,315,000	$395,481,000

Canada's Problem of Empire Trade

Should any plan of imperial preference be formulated to which Canada would be asked to assent, the problem before her would be so to rearrange her tariff system as to give free entrance to merchandise from any part of the Empire in exchange for a free entrance for her own commodities. The problem, from a strictly Canadian point of view, narrows down to what she would profit

by gaining a free entrance for her products in exchange for a certain amount of sacrifice in admitting empire products free.

To take the case of Canada and the United Kingdom, it will be found that in the year 1929 Canada's exports of grains and animal products to Great Britain amounted to $234,700,000, out of a total of $290,389,000, or 81 per cent. The balance, roughly $56,000,000, was made up principally of wood and paper ($21,000,000); non-ferrous metals ($15,000,000), and iron and its products ($8,000,000). If the United Kingdom adheres to her policy of not taxing foodstuffs, then 80 per cent. of Canada's products entering her ports will receive no advantage whatever. If we take the year 1928 instead of 1929, when Canada's exports of grain and animal products were far larger, we find that her total exports to Great Britain amounted to $446,000,000, of which $392,000,000 were grains and animal products, or 87 per cent. It may be safely said that at least 85 per cent. of her annual exports to Great Britain are always food products, on which she would gain no preference whatever.

Turning now to her imports from Great Britain, we find the principal items to be as follows:—

Alcoholic Beverages	$38,642,000
Wool, Raw, Yarns and Fabrics	37,755,000
Metals	29,375,000
Cotton Yarns and Fabrics	12,646,000
Flax, Hemp and Jute	6,762,000
Chemical Products	5,502,000
Tea	5,030,000
Coal	4,827,000
Clay Products	4,361,000

It will be observed from the foregoing that the textiles, cotton, wool, and flax, form a very large part of the imports from Great Britain, over $57,000,000. Wool, in its various forms, pays, on an average, 20 per cent. in duty; cotton and jute pay about the same. Canada is building up, under difficulties it must be confessed, but surely and at the expenditure of a great amount of capital, a vigorous and efficient textile manufacture. It is true that some of the finer weaves and most expensive

materials cannot yet compete with the beautiful craftsmanship of Great Britain and France, and will be imported for the luxury trade for a long time yet. But however that may be, it is undoubted that Canadian textiles are excellent and improving steadily. It is inconceivable that she could ever consent to the free importation of English cottons and woollens and thereby deal a blow at her own textile industry, which if not fatal would at least be a serious one. Her duties on alcoholic beverages are heavy, but again such a source of revenue to the state, one utilized in every country, would not be given up under any circumstance. The case of the metals is far too intricate to go into here, but again it can be assumed that an industry which, after a long and by no means easy fight for existence in the face of many odds, is now getting on its feet, would not be subject to such a blow as the removal of the duty on metals imported from Great Britain. It is needless to continue the recital over the various items that comprise Canada's purchases from Great Britain. Suffice it to say that in a majority of cases they comprise commodities which Canada is bending every effort to manufacture for herself. And what would Great Britain offer in exchange? A preference on not more than 20 per cent. of her imports from Canada.

Within such circumscribed limits it is not possible to do more than indicate some of the more obvious problems that await fuller investigation. The whole question of imperial free trade is excessively complex, and not least so is Canada's position in the scheme. It may not be beyond the wit of man to evolve a workable system of free trade, but it must be confessed that it is difficult to see exactly how it can be done. The problem, in its last analysis, comes down to the adjustment of trade relations between a country like Canada that is rapidly building up her own manufactures, and finding difficulties enough in the process, and a country like Great Britain where industries are long since in what we may, perhaps inaccurately, term the final stage of their evolution. And in such an adjustment obvious difficulties lie.

BANKING IN CANADA

By Beaudry Leman, B.Sc., C.E.

President of the Canadian Bankers' Association, and General Manager of Banque Canadienne Nationale

BEFORE banking in anything like the modern sense developed in Canada, a system of barter was in operation. In the latter part of the sixteenth century, Tadoussac at the mouth of the Saguenay River, over one hundred miles below Quebec on the north shore of the River St. Lawrence, was the centre of the fur-trade. Early merchant adventurers from France laid in a stock of goods consisting chiefly of arrow-tips, swords, hatchets, knives, kettles, cloaks, blankets, hats, caps, shirts, cloths, biscuits, tobacco, to exchange these with the Indians, at Tadoussac and other points, for furs such as beaver, lynx, fox, otter, marten, badger, and muskrat. The furs were disposed of in France, and the operation repeated the next season.

The need for a medium of exchange was under these conditions confined within definite limits. To meet this need there was one article of universal acceptance which answered all purposes of exchange except for small currency, and that was the beaver skin. To a certain extent other furs furnished such medium, but none so adequately as the beaver, especially as the price at which it was receivable was fixed by the Company of One Hundred Assocates, a syndicate established about 1627, as part of the colonial scheme of Cardinal Richelieu, the great minister of Louis XIII. It is recorded that, about 1650, letters of exchange began to pass freely between the colony at Quebec and France, the growing contributions from France in support of missions and for religious institutions adding considerably to the business of exchange. Increasing quantities of coined money from the Mother Country came into circulation in this period,

and shortly after, for we find that though coins were scarce outside the trading centres of Quebec, Three Rivers, and Montreal, coined money was in regular use especially for filling in the gaps between uneven barter.

Card money was issued in Canada by the Intendant de Meulles in 1685. He informs the minister: "I have no money to pay the soldiers, and not knowing to what Saint to make my vows, the idea occurred to me of putting in circulation notes made of cards, each cut into four pieces; and I have issued an ordinance commanding the inhabitants to receive them in payment." The cards were common playing cards, and each piece was stamped with the *fleur-de-lis* and a crown, and signed by the governor, the intendant, and the clerk of the Treasury at Quebec. They were convertible into bills of exchange at a specified period. Other cards domiciled in France appear to have issued afterwards, payable to bearer on demand, which circulated freely to the extent of the currency required in the colony; the rest were remitted to France or converted into bills of exchange.

During a period of nearly thirty years the card money circulated and served as currency in the ordinary transactions of life in the colony, and was considered safe to take in satisfaction of a debt; because, if not convertible into coin in Canada at the will of the holder, it was redeemed in bills of exchange on the Royal Treasury, which constituted an excellent remittance for the colonists who had to meet their engagements in France.

Prior to the passing of French power in Canada, there was an enormous issue of paper currency. This currency, and the prospect that it would not be redeemed, resulted, as is usual in such cases, in all the metallic currency being secreted by the inhabitants of the country. The metallic currency which had come from France simply disappeared into the recesses of strong boxes which are kept by people even in the narrowest of circumstances. The same happened to the specie which accompanied the officers and troops who served under Montcalm in the final campaigns (1755-1758). Complaints arose that nothing but paper money was to be found in circulation. When,

therefore, the paper money suddenly became practically worthless, the people generally were not entirely ruined, nor was the country quite deprived of a circulating medium. Metallic money began to come out of hiding and merchants drove quite a brisk trade, although the paper currency was worthless and the metallic money woefully inadequate for the country's needs. Consequently, with the development of commerce the necessity for banks became greater and greater. Efforts to introduce the practice of banking in its modern form into what were then (after 1763) the British North American provinces, now a part of the Dominion of Canada, were put forth as early as 1792. The Canada Banking Company was organized in that year by certain firms and merchants in the city of Montreal in Lower Canada. It was not destined long to survive. One of its five shilling notes which has been preserved, dated August 10th, 1792, "Pour 5 Chelins"—the denomination being expressed in both languages---is proof that it exercised the function of issue.

Twenty-five years passed before the next considerable project of a bank of issue, discount, and deposit was brought to the point of opening for business. This also was in the city of Montreal. In 1817, for lack of legislation giving them corporate powers, the promoters of a new bank began to operate under articles of association and continued to do so until a provincial charter was granted in 1821. This was the beginning of the Bank of Montreal. In 1822 the Quebec Bank obtained a charter.

Some of the legislative powers may be here noted. The power of issue was limited to an amount equal to the paid-up capital and the gold and silver coin and bullion actually on hand. One dollar was the lowest nominal value for which a note might be issued, and the amount of notes for a less sum than $4 could not exceed one-fifth of the paid-up capital stock. The banks were forbidden to stipulate for, take, reserve, or exact a higher rate of discount or interest than seven per cent. per annum.

In 1832 the Bank of Nova Scotia at Halifax was granted a charter and an important feature in modern

Canadian banking first made its appearance in the charter of that bank—namely, the double liability of shareholders to creditors of the bank in the event of insolvency.

In Upper Canada, in what is now known as the province of Ontario, a charter was granted in 1817—the first banking charter granted in Canada by a legislature—to an institution under the name of the Bank of Upper Canada with head office in Toronto. An oversight in the Colonial Office prevented ratification, and it was not until 1822 that banking operations were actually carried on under its provisions. This institution continued in existence almost down to the date of Confederation, and discharged important banking functions, but in 1866 it was obliged to go into liquidation.

The Dominion of Canada came into being by the British North America Act, which received the royal assent in 1867. The banks which had previously received charters from provincial legislatures were by this Act brought under the authority of the parliament at Ottawa, and the business of banking was among the matters in respect of which the Canadian parliament alone could enact legislation.

The following is a summary of the chief provisions governing banks as set forth in the legislation in force when the Dominion of Canada was formed:

There was power:

(*a*) to deal in gold and silver coin or bullion and exchange, bills of exchange, discounting of promissory notes, bills and negotiable securities and any such other trade as belongs legitimately to the business of banking;

(*b*) to make and issue bank notes;

(*c*) to open branches or agencies.

Among the limitations:

(*a*) Lending money on the security of lands was forbidden;

(*b*) Dealing in, buying, selling, or bartering goods, wares, and merchandise or engaging in any trade whatsoever, was prohibited; and

(*c*) Making advances upon the security or pledge of any shares in the stock of the bank or of any other Canadian bank was likewise prohibited.

The banks were, however, authorized to take and hold mortgages and liens on both real and personal property by way of additional security, the origin of this provision being found in the charter of 1821 of the Bank of Montreal.

It was not by accident that Canadian banks were denied the power of lending money on land. The era of land speculation in the early part of the nineteenth century in the United States resulted in the failure of many of that country's banking institutions. In recent years in the United States, due to the steady market for improved city property, national banks have been allowed to lend a portion of their funds on first mortgages, but in view of the speculation in real estate which at various times and in different sections has been rampant in the past sixty years in Canada, the banks have steadily held by this principle of the original charters.

In 1871 the first Bank Act for the whole of the Dominion was enacted. It was in fact a consolidation of the powers and limitations of the existing banks as set out above, and these powers and limitations, with some modifications, will be found in the Bank Act in force to-day. By the Act of 1871 the charters of the banks were extended until July 1, 1881, from that date to the present the duration of bank charters has been limited to ten years.

Branch banking stands out as one of the early features in Canadian banking legislation. Even the early charters granted before Confederation authorized the establishment of branches. Branch banking is suited to the conditions which prevailed in this country—that is among pioneer settlements needing banking facilities, but with no means of meeting that need. The older, more populous, and wealthier sections where the head offices of the banks are situated, provide through a branch bank the necessary funds for facilitating local production and for marketing grain and other articles of commerce.

While there are at present only eleven chartered banks

operating in this country, these banks had on December 31, 1929, 3,595 branches spread from the Atlantic to the Pacific, so that every small town and village can boast of at least one branch bank where banking facilities, with the resources of a great institution behind it, are available to the local community. In addition to the branches referred to, there are 663 sub-branches in hamlets and countrysides where banking facilities from a near-by branch are available one or two days a week. Many of these are in the province of Quebec, and a local notary is frequently the representative of the bank. In addition, Canadian banks had 186 branches in countries outside of Canada, namely, Great Britain, Newfoundland, France, United States, Mexico, West Indies (in practically all islands where commerce is carried on), in six different countries in South America, and in Spain.

There are thirty-two clearing houses in cities, where settlements are made every business day between banks of obligations payable by or through the respective banks. In twenty-eight of these cities, settlements are effected by drafts upon the nearest of the four chief clearing centres, namely—Montreal, Toronto, Winnipeg, and Vancouver, where the banking transactions at and tributary to these four points are daily adjusted. Balances in favour of or against the several banks at these four centres are, as soon as declared by the clearing house manager, communicated to a trust company in Montreal. From Toronto, Winnipeg, and Vancouver the communication is by telegraph. The trust company thereupon enters these debits and credits in an account with the several banks. Banks maintain with the trust company substantial balances of legal tender, so that it is usual for the banking business of the whole country to be adjusted by a few entries in the trust company's ledger and without the physical transfer of gold or Dominion notes, the other legal tender of the country.

In addition to the chartered banks there are two savings banks with special parliamentary charters—the Montreal City and District Savings Bank and La Caisse d'Economie de Notre Dame de Québec, dating from 1847 and carrying

on business in the cities of Montreal and Quebec respectively. The former in its last return to the government had total assets of $61,771,284, and the latter, total assets of $15,789,225. They are not commercial banks, but invest the great bulk of their assets in government and municipal bonds. They afford a safe depository for a large number of people of the artisan and working class.

Canadian banks are the intermediaries between depositors and borrowers in all parts of the country. Through their instrumentality the production of the country —agricultural, manufacturing, and that arising from various other industrial activities—is facilitated; crops, raw materials, and manufactured products are moved to market at home and abroad through their aid, and the foreign branches greatly assist in laying down foreign goods and products in Canada.

From the foregoing it will be inferred that progress in the science and technique of banking has been made in Canada since the days over three hundred years ago when beaver skins were the medium of exchange, and were used to settle the debit or credit balances between traders and hunters. The contrast between beaver skins the medium of settlement of that day, and a few entries by a single clerk in a trust company's ledger in Montreal adjusting and settling finally the multitudinous financial transactions of half a continent, is indeed great.

In closing this brief outline of the history of Canadian banking, reference must be made to the Canadian Banker's Association. Originally in 1893 a voluntary organization, a parliamentary charter was granted to it in 1900. Through this organization the heads of the various banks have been able to bring united counsel to bear on all problems of joint concern, to take immediate and concerted action in emergencies and to promote the interests and efficiency of banks and bank officers. In other directions, also, notably in the supervision of the note issue and circulation, the establishment and regulation of clearing houses, and the appointment of a curator to a suspended bank, the Association is called upon to perform important duties.

LIFE ASSURANCE IN CANADA

By George H. Harris

Sun Life Assurance Company of Canada

THE pioneer company organized for a general life assurance business in America was the Mutual of New York[1] which began business in 1843. Following this, several companies which still stand in the forefront of the business, were organized. By 1851 there were eighteen companies in the United States.

In Canada, where the population was small and scattered, such policies as were in existence at that time were held almost exclusively in the British National Loan Fund. Interest was stimulated by the activity in the United States, and presently a number of companies, both British and American, extended their operations to this country. By the time of Confederation, about fifteen million dollars of life assurance was in force on the lives of Canadians, of which, approximately, two-thirds was held in British and American companies.

The first Canadian company was organized in 1847. Its birth was in a measure a declaration of independence. Hugh C. Baker, of Hamilton, Ontario, a gentleman of considerable banking experience, desired to assure his life, and for that purpose applied to one of the American offices. There was a little hesitancy on medical grounds, and he was requested to go to New York for an examination. This was no small undertaking. Transportation southward to New York involved many forms of locomotion, including stage-coaches and saddle-horses. Four days were required for the journey, there being no facilities for travel by night. In all Canada there were not

(1) The first president of the Mutual of New York, and one of its organizers, was a Canadian—Morris Robinson, born in Nova Scotia in 1784.

fifty miles of railway, and none was of service to Mr. Baker. Mr. Baker was a thoughtful and studious man, and the moral of the situation was not lost upon him. His patriotism was aroused, and he decided to found an assurance company in his own town. He interested some associates and, as a result, the Canada Life Assurance Company—the first native company to dedicate itself exclusively to life assurance—came into being. It issued its first policy on October 29, 1847.

The efforts of the Canada Life, in spite of early difficulties, were gradually rewarded. There followed other attempts to form companies, but prior to Confederation the Canada Life alone emerged on an enduring basis.

The Confederation of the Canadian provinces in 1867 resulted, by the close of 1871, in the creation of a political entity stretching from the Atlantic to the Pacific. The new Dominion, however, had done little more than stake her claim to her vast territories.

The impediments to the development, on any large scale, of such a business as life assurance, were many and severe, and yet several companies of more than national renown owe their inception to this period. The Mutual Life of Canada, the Confederation, and the Sun Life of Canada all commenced operations in 1870 and 1871; the London Life followed in 1874. These were courageous enterprises indeed; but they have been more than justified in the result.

The practice of life assurance in Canada has been profoundly influenced by practice in the United States; and its practical manifestations undoubtedly more closely reflect the methods of the United States than those of Great Britain. While Great Britain must be regarded as the pioneer in the scientific development of modern life assurance, the first place in giving practical effect to the system can hardly be denied to the two North American countries. It is reliably estimated, indeed, that assurances held on the lives of citizens of the United States and Canada are more than double the volume of assurance in force throughout the rest of the world.

To the average American and Canadian, life assurance

has more practical than academic appeal; and perhaps the greatest contribution to the business as a whole, on this continent, in ways both scientific and practical, has been in broadening the scope of the system and the extension of its constituency. Notable work has been done towards liberalizing the policy contract, which, formerly a somewhat arbitrary and forbidding document, has become attractive rather than repellent. Remarkable strides have been made in marketing methods, which have been developed from the premise that people do not always apprehend their duty nor, indeed, their advantage, until it is called to their attention with clarity and force.

One remarkable characteristic of salesmanship in North America is that, for all this practical outlook, the altruistic and moral appeals of life assurance have been greatly emphasized, and have proved outstandingly effective. The average agent rarely evades the issue of his client's duty to his home and family—the domestic appeal, indeed, is the fulcrum of his argument. Its potency is testified by the fact that of the policies sold on this continent, nearly 80 per cent. are on Life plans, in which protection features predominate; as contrasted with experience in Great Britain, which reveals nearly 80 per cent. of sales on endowment plans, in which investment features predominate.

The notable work that has been done in enlarging the scope of life assurance has resulted in many risks being accepted by the companies, which, in an earlier day, would have been unacceptable. Prominent among modern innovations is that of granting assurance on under-average lives, on terms adjusted to the condition of the applicant. This development has been of gradual growth, and to it both the medical and actuarial professions have contributed their best thought. From the timid and experimental ventures of forty years ago, the system, with growing experience, has been developed to the point where sub-standard risks can now be rated with as great a degree of confidence as standard lives. To the volume of data that has been assembled, the companies in North America have contributed freely and unreservedly, so

that their accumulated experience, generously exchanged, has given to each greater security.

An innovation which had its inception in Canada about ten years ago, and has developed extensively in the United States as well as Canada, is that of writing assurance without medical examination. Many misconceptions were at first engendered, but these, happily, have been largely resolved with growing understanding and experience.

That the medical examiner occupies, and will continue to occupy, a significant place in the organization of every life assurance company which aims to render the highest form of service to the public, will be generally conceded. The acceptance of this view probably inspired the popular belief that the medical examination, if not the only means of determining the quality of lives to be assured, is at least an indispensable factor. In point of fact, the medical examination is but one of the instruments used to determine the eligibility of applicants. Its main function is to determine the physical condition of the applicant at the moment of applying for assurance. Other important considerations, however, have of necessity to be satisfied, and by other means; and it has been found that within closely defined limitations, even evidence of health, sufficient to the needs of the case, could be obtained by means other than that of a physical examination. The practice has now passed the experimental stage, and experience has been eminently satisfactory. It has proved a great convenience in a country which is sparsely populated, and whose citizens are often many miles from the doctor.

Many other modern innovations, by enhancing the attractiveness of life assurance, have tended to broaden its scope. Notable among these is the total disability provision, which offers a remission of premiums during a period of disablement, and generally the payment of a monthly income in addition. This much-appreciated feature involves but little addition to ordinary rates. A double indemnity provision is also offered by many companies, providing for payment of double the amount

assured in case of death by accident. Group assurance and salary savings plans operated under a co-operative arrangement with employees, have put almost countless millions of dollars of protection on the lives of humble workers; and have removed from many modest homes the distress which so often is the concomitant of bereavement. And with the great growth of the business, to which these improvements in practice have so potently contributed, the companies have found it possible constantly to enlarge the amounts they are prepared to take at risk, thus opening wider the door to the man of large affairs.

In practical result, it has been estimated that at least forty per cent. of the assurance to-day accepted by the companies would have been unacceptable under the under-writing rules of a generation ago. And this broadened service has been accompanied by a constantly and consistently improving experience, resulting in added safety, and diminishing cost to the policyholder.

It may be accepted as a truism that no large-scale business can become established on an enduring basis unless it is able to win and hold general confidence. Of no business is this truer than of life assurance, for every premium it receives bespeaks confidence in its ability to meet obligations which may not mature for ten, twenty, or even fifty years. In its essence, life assurance is built for permanence; and the business entrusted to it presupposes the principle that while men are mortal, the institution of life assurance can never die.

The history of life assurance is a history of emergence from distrust and suspicion to a position of universal confidence. In Canada, as elsewhere, the interests of policyholders are safeguarded by law; and the Dominion Insurance Act commands so wide an esteem as to be largely regarded, even in other countries, as a model for the whole world. No company holding the licence of the federal government has ever failed by one cent to meet its obligations as they fell due—evidence not only of sound management, but of the effectiveness and capable

administration of the Insurance Act. The operation of life assurance in the various provinces is similarly regulated by provincial laws.

In the development of these measures for the legal protection of policyholders, the companies have aided the government with their best thought and skill. The exigencies of competition—a healthy element in any business—have not jeopardized co-operative enterprise; as such associations as the Life Insurance Officers' Association of Canada, the Life Agency Officers' Association, and, among the agents themselves, the Life Underwriters' Association of Canada, abundantly testify. These bodies have contributed enormously to the promotion of the worthy elements in the business, and to the elimination of abuses, and to this end have long co-operated with each other and with the various insurance departments. The mainspring of all these activities is to render the highest and safest form of service to the public; and they have won, as they have deserved, an almost unanimous confidence.

At the present time, it is estimated that fifty-six per cent. of the entire population of Canada and the United States—men, women, and children—carry life assurance; if in a great many cases the amount is small, it is for that reason, perhaps, most needed, and implies the realization of need. Although the death of a policyholder follows the application, on the average, at a considerable distance of years, already every third death on the North American continent at present involves the payment of life assurance. The total amount in force is more than $100,000,000,000—an average per capita, of over $900.

With the exception only of the United States, Canada stands as the best assured country in the world. Its people, numbering less than 10,000,000, are protected by life assurance amounting to approximately $6,500,000,000. The average assurance per capita is about $650; which means, for the family of four, $2,600. The premiums paid by Canadians on their policies each year form a tremendous testimony to their innate thrift, and to their sense of responsibility.

HIGHER EDUCATION IN CANADA

By Sir Robert Falconer, K.C.M.G., D.C.L., LL.D.

President of the University of Toronto

TO anyone who is acquainted with the history of the provinces of British North America, and recalls the distressful origins of colleges and universities, the progress of the last hundred years in higher education in Canada is very encouraging. Even statistics prove that higher education is a most important factor in the life of the Canadian people. There are now in Canada twenty-three universities, six of them state-controlled, thirty-one classical colleges affiliated with the French-Canadian universities of Laval and Montreal, and twenty-nine professional and technical colleges. In these institutions there are enrolled over 25,000 full-time students and over 23,000 part-time students, including those in vacation and extension courses. The total assets of these colleges and universities far exceeds $100,000,000; and their annual expenditure is more than $15,000,000. Recognition of the quality of Canadian higher education, moreover, has been won in the centres of the wide academic world, as was evidenced when, at the recent celebration of the centenary of one of the older Canadian universities, there were received delegates and addresses from more than two hundred and fifty universities and learned and scientific societies of Europe, America, Australia, and Africa.

The present intellectual status of Canada, dependent as it has been so largely upon the universities, is the result in the English-speaking Eastern provinces of long continued struggles and of several streams of influence; but in general there are two confluent currents, English and French, which, like a main river and a great tributary, are easily discernible side by side, and will not inter-

penetrate within any visible reach of Canadian national life.

In the days of Bishop Laval, who founded the Quebec Seminary in 1668, the clergy adopted the educational system of the Jesuits as it was in France in the seventeenth century. From such small beginnings as a Latin school, organized by a priest for his own parish, have grown many of the thirty-one classical colleges now affiliated with Laval and Montreal Universities, under the direction of the diocesan clergy or of a religious community. All these colleges are boarding-schools, and are designed primarily to recruit the ranks of the clergy, but also to educate boys for liberal and professional careers. "To train both a religious and a civil élite was the main intention of the founders." As compared with the system that holds in the high-schools of English-speaking Canada, that of the classical colleges of Quebec requires a longer and more intensive study of literary subjects, and science is confined practically to what in the rest of Canada would be the earlier half of the Arts course. French Canadians are satisfied with their methods of education and point with pride to those who have held and still hold eminent positions in the public life of Canada, and who have been the product of their colleges. The lawyers of Quebec, educated in the principles of the civil as well as the common law, have to some extent an advantage over those of the English provinces, and not a few of them are among the most learned and brilliant members of the Dominion bar.

Of recent years graduates, especially of Montreal, have gone in large numbers for advanced professional and scientific study to Paris, which seems likely to mould in increasing measure the younger mind of the province of Quebec. Every year distinguished professors from France visit the two French-Canadian universities, and a few years ago the high honour was paid Montreal of having its outstanding economist, M. Montpetit, chosen as an exchange professor in the Sorbonne. As the connections between educated Quebec and Paris are multiplied, the intellectual and cultural ideals of Old France may

prevail again in what was once affectionately called "New France". This process cannot fail to enrich the culture of Canada as a whole, as well as add colour to the social life, especially at metropolitan points of contact such as Montreal and Ottawa.

The history of the higher education of English-speaking Canada may be summarily divided, for the purpose of emphasizing its leading characteristics, into three periods: (1) from the coming of the Loyalists until Confederation in 1867, (2) from Confederation until 1906, and (3), from 1906 to the present.

The first period was one in which the influences of the English, Scottish, and Irish universities were not only dominant, but also direct. For three quarters of a century nearly all the professors, except in two or three colleges, came from the Mother Country, and maintained in the British North American provinces the academic ideals and, as far as possible, the standards in which they themselves had been educated.

The first institution of higher learning in English-speaking Canada was King's College, established at Windsor, Nova Scotia, in 1789, where it remained in unbroken activity until 1923, when it was transferred to Halifax and associated there with Dalhousie University. If the rise of Canadian colleges and the struggles which some of them barely survived are to be understood, it is necessary to keep in mind the changes that passed over higher education in Great Britain in the nineteenth century. The briefest outline must suffice. That century was the most momentous in the history of the universities of England. In the last decade of the eighteenth and the first of the nineteenth century, things continued much as they had been for many generations, except for an occasional spasm of the sleeping giants when scouts of advancing reform prodded them with agitating demands. In Oxford the School of *literae humaniores* was formed in 1802, and mathematics and physics in 1807; at Cambridge also triposes begun in the eighteenth century were developed somewhat later. But shortly after this the ancient seats were astir, movements were

led by powerful personalities, and in 1858 the report of the great Commission gave authority to changes that had been coming in during several decades. Over the country heralds of science were arousing the mind of England; men of letters, philosophers, and poets were giving utterance to the ideals of a new day.

At the opening of the century the Scottish universities were in a much more healthful and alert condition than their older English sisters. The Medical School of Edinburgh was one of the greatest in the world, and from it the torch had been carried across the ocean to Philadelphia, where it kindled a fire in a new hearth in the University of Pennsylvania, soon to be the best college of medicine in the United States. In 1827, moreover, the University of London was founded to give academic opportunity to those who could not assent to the ecclesiastical tests of Oxford and Cambridge, and in its subsequent developments in University and King's Colleges it became a model for one of the most important features of Canadian higher education, the federation of universities and colleges into a unity.

Before Confederation Canada felt some of the influence of the new movements in England, but their full force did not strike upon these shores until later. It was the mind of the Oxford and Cambridge of pre-reform days that fashioned the earliest colleges, especially the three King's Colleges at Windsor, Nova Scotia (1789), at Fredericton, New Brunswick (1800), and at Toronto (1827). Scottish influence expressed itself in revolt against these and was able to give birth to rival institutions for all comers, Dalhousie University having been founded in Halifax in 1818, and Queen's in Kingston, Ontario, in 1841.

Such bitterness was carried over from those early days and such memories of strife, denominational and political, that it was not possible until within the last generation to estimate the factors of the situation dispassionately. Now these are becoming better understood, as are also the motives of the men who were at variance with one another. The natural assertion of supremacy on the

part of the representatives of the tradition of the old English universities was the exciting cause of the struggles. But to pass a just judgment upon some of the chief actors two conditions must be kept in mind: (a) the earliest ruling class were loyalist, and were desperately afraid of the republican ideas which they saw thriving on their border like a green bay tree, (b) the only type of higher education which they knew and believed in was that of England. It had been confined to men of their own class, and from it dissenters were rigorously excluded. If a strong growth of this culture could be promoted, it would choke off, they were convinced, the republicanism which might so easily spring up in a crude country polluted with pernicious seed. What they did not take into their account was the great numerical superiority of dissent in the British North American provinces, and the Scottish origin of much of it. Nor had they understood their fellow citizens well enough to realize the spirit of independence, unknown among similar classes in England, or if known repressed, which had been created or found expression throughout the frontier settlements, or the ambition that possessed them to obtain educational privileges for their families. Experience has made plain to us that, given the conditions, the results could not have been other than they were, when strong personalities not blessed with the spirit of tolerance, never a leading virtue on the frontier, were able to invest a political or social conviction with a religious sanction.

For several decades the process of the detachment of state-aided higher education from ecclesiastical control proceeded slowly, attended by political rumblings; but secularization was inevitable in the long run. Fortunately for the people of Ontario, financial stringency brought opponents together in the hope of getting government support. Taking the University of London as its model, and perhaps in some measure the collegiate and university system of Oxford and Cambridge, Ontario wrought out for the first time the new relationship of denominational universities and colleges federated with the state university, but retaining their own independence

and atmosphere. Within the last twenty-five years federation has become remarkably successful in the University of Toronto, and has been taken as a model for Manitoba and the newer universities of the West. The university, supported by the state, provides instruction in all subjects, except the collegiate, in all faculties; it equips libraries, laboratories, and the professional schools. The colleges, including the provincial University College, are confined to arts, and teach the languages with ethics or it may be history or philosophy. The student in arts is under the discipline of his own college, but is examined and is given his degree by the university. The chief differences between the Canadian colleges and those of Oxford and Cambridge lie in the denominational character of all but the state college, the narrow range of instruction, and the smaller numbers in residence.

The cultural tradition of the older English-speaking universities of Canada comes in the main from England, Scotland, and Ireland, through a constant supply of professors, who in the latter half of the nineteenth century brought something of the new spirit that was quickening Great Britain. To the memory of these men Canada owes the profoundest homage. Communities were small, intellectual interests were few, the outlook was narrowly colonial. But those scholars permeated their little societies with vital ideas. Huxley and Tyndall both applied for chairs in Toronto, but were passed by for men of less reputation, and in one case of greater political influence. It is interesting to conjecture what might have been the effect upon themselves if they had been chosen, and what upon Toronto.

In the period from Confederation until 1906, the Canadian people entered upon a new era just at the time when English learning and science were coming to an unprecedented fulness of power; and during the latter half of this period an especially rich infusion of the best young life from British universities, was received in the universities of McGill, Queen's, and Toronto. Even before Confederation the origins of the present honours system are traceable in Toronto, attempts having been made

to introduce standards not unlike those prevailing in the English universities and in Dublin, but not until this period did the courses for honours develop so as to become a permanent characteristic of Canadian higher education.

The growth of a national spirit in Canada which followed on the political union of the provinces found expression also in education. By the middle of the nineteenth century a select few had gone to the Old Country to complete their education and had returned to take positions at home. Of these the two most outstanding were, perhaps, Sir William Logan and Sir John William Dawson. The former was born in Montreal of Scottish parents in 1798 and was educated at the University of Edinburgh; he was appointed in 1842 first director of the Geological Survey of Canada. Dawson, also of Scottish origin, was born and received his earlier education in Nova Scotia, but he too went for further study to Edinburgh. In 1850 he accepted, at the request of the Hon. Joseph Howe, the superintendency of education in his native province, and in 1855 was elected, on the advice of Sir Edmund Walker Head, to the principalship of McGill University, a post which he filled with distinction till 1893. The most notable personage of this period in the secondary education of Upper Canada, was Egerton Ryerson, whose training was received on this continent. In the latter half the best known figures were George Munro Grant and Sir William Osler. Grant, like Dawson, of Scottish origin and born in Nova Scotia, received his early education there, but graduated from Glasgow University. From 1877 to 1902 he was principal of Queen's University, and guided it through weakness into strength. Osler, born of English parents in Ontario, received his arts education in Trinity College, Toronto, graduated in medicine from McGill, spent several years afterwards in London, and returned to begin his brilliant professional career in McGill.

The venturesome Canadians who first professed to be able to take their places alongside scholars from the Old Land had to break a tradition, and occasionally the cry was heard that the sons of the soil were not given an

open field, but as larger numbers of carefully selected graduates of Canadian universities went or were sent across the ocean for advanced study, it became evident that the colonial brain and character were as good as any other, if given equal opportunity. Accordingly positions at home were rapidly occupied by the native-born, and now, as will be seen by a glance at any calendar, the majority are filled by them. But happily most institutions still draw for their staff many of British birth and education, and it is to be hoped that this rich contribution to the higher life of the country will not lessen. The value of this British influence upon the spiritual ideas that prevail in Canada can hardly be over-estimated.

Throughout the latter part of this period the United States also became an important factor in the higher education of the Dominion. Acadia University in Nova Scotia had always been in close touch with New England; Victoria University and McMaster in Ontario, also, were not a little influenced by the neighbouring states; and individual American professors were found from time to time in most colleges. But the chief influence was felt through Canadians themselves, who had gone for postgraduate study to Johns Hopkins, which was opened in 1876 under the remarkable presidency of Dr. Gilman, to Harvard, to Yale, to Columbia, and in later days to Chicago. Johns Hopkins, as is well known, revolutionized graduate studies in the United States. By this channel the ideas of Germany were transmitted to the New World. American scholarship and science got a new start, and older universities caught from the latest born an inspiration which transformed their outlook. Very generously the fellowships with which Johns Hopkins was liberally provided were thrown open to Canadians on the same terms as to Americans, and were won by some of the best students of their time, who in competition gave a good account of themselves, and have since abundantly fulfilled their early promise by the work which they have done for the universities of their homeland. Unfortunately, however, the positions at home were too few,

and much of the exodus of Canadians to American institutions has remained in them as a permanent contribution to their life. Probably there are six hundred graduates of Canadian colleges holding teaching positions of a high grade in the United States. Even at present there is some drain, and almost every Canadian institution is frequently reminded to its cost that efforts are being made unceasingly by the well-endowed universities across the border to draw one and another of its best men to attractive positions. Happily, however, the attachment of the Canadian to his own country is strong, and he prefers, unless for relief from financial strain, to remain at home.

The third period opens with the year 1906. This date has been chosen because in it the Legislature of Ontario, under the premiership of Sir James Whitney, passed a new Act dealing with the constitution and endowment of the University of Toronto. This was the outcome of the report of a commission composed of leading citizens of Ontario under the chairmanship of Mr. (now Sir) Joseph Flavelle. The commission recommended that annually a sum of money equal to half the succession duties of the province, on the average of the preceding three years, should be granted by the Legislature to the Board of Governors, which was to be appointed by the government to control the non-academic side of the university. This was the real beginning of the expansion which has continued, except during the War, for the past twenty-two years. When the sum of $500,000 was reached and succession duties were mounting rapidly, this method of financing the university ceased, and thereafter each year the legislature has voted the difference between revenues and expenditure. In spite of heavy demands upon the treasury the governments of the province have dealt generously with the university, and it may be said that in return the university has justified the support, having progressed as never before in its history.

The importance of this University Act is to be estimated not only by what it did for the provincial institution of Ontario, but by the example it set to the new uni-

versities of the Western provinces. The British North America Act assigned the control of education to the provinces, and except within very narrow limits no aid is given by the federal parliament. Manitoba University was founded in 1877, but the other Western provinces did not create universities until after the Ontario Act was passed, Saskatchewan in 1907, British Columbia in the same year, and Alberta in 1906. The constitutions of these three were much influenced by that of Toronto, though individual features were introduced to suit local conditions, some taken from American state universities. Supported liberally by their legislatures, they have made astonishing progress. On spacious, even commanding sites, with admirable buildings and equipment, and manned with graduates of the best rank from the older Canadian universities, Great Britain, and the United States, these universities have provided education for their provinces of very high quality, and are attended by students to the number of from 1200 to 1700, of even 2800 in Manitoba. In all, the arts faculty is central, but agriculture has received much attention, and professional faculties are gradually being formed to meet provincial demands. Extension work also holds an important place. As in Ontario, the governments work through boards of trustees, and have allowed a large measure of freedom to those who are most intimately associated with the institutions.

It is worthy of note, also, that since 1906 the privately endowed universities, such as McGill, have benefited in a much more copious measure than before from private benefactions, in the form of buildings, endowments, and scholarships.

The characteristics of the present period have been, in the older universities, consolidation and growth on lines laid down before 1906, and in the newer universities, the creation and development of high intellectual ideals in communities which are the outcome of extraordinary material success. So similar are the universities of West and East, and so constant is the intercourse between them, that they are forces of great power in the unifica-

tion of the Dominion. University conferences are held annually at different centres when common problems are discussed, and at these a strong spirit of friendliness has always been manifest.

During the past twenty-two years the Canadian undergraduate degree in arts has won respect abroad. Harvard, Columbia, Chicago, and the other leading universities in the United States readily award fellowships to Canadian students for postgraduate work, and frequently word comes from Oxford and Cambridge that the colleges are not disappointed in the quality of those who have gone from Canada with a good record. Not a few Rhodes scholars have returned to chairs in Canada, and proportionally the results from Cambridge are quite as good. This success is doubtless due to the honours system in arts which has been derived from England, and which hitherto has differentiated Canadian higher education from that of the United States. In accordance with this, those who in their latest years at school have shown aptitude for special work are allowed intensive study and receive special direction in small groups. Nevertheless the general, or pass student, is not without careful oversight. He is not permitted as much option in his subjects of study as his American contemporary, but must make his choice from groups which are arranged so as to provide a well-balanced education.

As compared with Oxford and Cambridge, the Canadian universities probably give more attention to the average and perhaps less to the gifted. At least it would seem that there are fewer brilliant students in the institutions of this new world than in those with a long tradition for learning. This young country has not yet the background of culture out of which England's great scholars, scientists, and men of letters appear; nor is there yet diffused through Canada such a belief in education for its own sake as has helped to give the Scottish people their high intelligence. The use of English, the love of literature, the appreciation of art and the humanities in general develop slowly, but the pioneer stage in Canada has all but gone and the civilization of this vigorous

people is shaping to finer issues. Already Canadian scholars have made noteworthy contributions in the historical, political, and economic sciences, and literary standards are taught by men of wide appreciation and critical judgment. Also in the pure sciences many Canadians have won gratifying recognition. Indeed, one of the most marked features of the universities during this last period has been the development of research. The solutions of some problems in medicine and the pure sciences have been of universal significance; other investigations, as in agriculture and forestry, have been stimulated by Canadian needs. Hereafter Canada must be more self-sufficient in providing postgraduate facilities, as apparently her universities offer less attraction than formerly to first-class men from Great Britain on account of the increase there both in salaries and in good positions. Nor has the United States an over-supply on which this country may draw; indeed, as has been shown, the current runs from north to south.

Professional education is almost entirely attached to universities, except in the case of training for the practice of law in Ontario. The medical faculties are widely and favourably recognized, dentistry is on a satisfactory basis, engineering in its varied branches is thoroughly established, ceramics, aeronautics and forestry are being developed with a view to provincial or Dominion requirements. Colleges for the training of ministers of religion have been maintained on a generous scale by the churches, as a rule in affiliation with the larger universities; a few denominational universities have a faculty of theology. Music and the fine arts are still in their incipient, but hopeful phases.

A noteworthy feature of the higher education of Canada is that nearly every large city is the seat of a university. Dalhousie is at Halifax, Laval at Quebec, McGill and Montreal at Montreal, Ottawa at Ottawa, Queen's at Kingston, Toronto with its federated colleges at Toronto, McMaster has just moved to Hamilton, Western Ontario University is at London, Manitoba at Winnipeg, Saskatchewan at Saskatoon, Alberta at Edmonton, and British

Columbia at Vancouver. Quite apart from any commercial advantage which these universities may bring, they are invaluable assets to the higher life of rapidly growing urban centres. In the midst of commerce and industry they bear witness to the things of the spirit, and are active agencies in the proclamation of idealism. As the pursuit of truth is a necessity for the life of civilized man, and discovery itself a glory to the human mind, the university in which these purposes are cherished helps the city to save its soul.

A SKETCH OF MEDICAL EDUCATION IN CANADA

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THE first occurrence of medical interest relating to Canada is recorded in the *Voyages* of Jacques Cartier, where a graphic account is given of the ravages of scurvy among his ship's companies during the winter of 1535-36, when quartered at Stadacona, now the city of Quebec. We are told that "with such infection did this sickness spread itselfe in our three ships that about the middle of February, of a hundreth and tenne persons that we were, there were not ten whole." Even at that early date it was the custom for ships trading to the St. Lawrence to carry medical men, usually apothecaries or barber-surgeons, and we learn that Jacques Cartier's surgeon examined the body of one dead of the disease for the purpose of ascertaining the cause of death, and of finding out, if possible, how to save the rest of the crew. The man who had the melancholy distinction of affording the material for the first autopsy ever held in Canada was Philip Rougemont, aged twenty-two years. The pestilence was eventually stayed by the administration of a decoction of the bark and juice of the spruce or pine, a remedy of which they learned from the Indians. The knowledge of the cure seems not to have become general, for we find that scurvy continued to be the principal scourge of these early expeditions and figures largely in the narratives of Lescarbot and Champlain, and even later.

With the establishment of permanent settlements in New France, such as Port Royal, now Annapolis Royal (1604), Quebec (1608), Three Rivers (1634), and Ville-Marie, now Montreal (1642), the need for hospitals

became apparent, and in due time they appeared. Five of these, still in existence, are of very respectable antiquity, antedating all similar institutions in North America, with the exception of one in Mexico, founded by Cortez in 1524. They are the Hôtel-Dieu of Quebec (1639), the Hôtel-Dieu of Montreal (1644), the Hôpital Général of Quebec (1693), the Hôpital Général of Montreal, now the Grey Nunnery (1694), and the Hôtel-Dieu of Three Rivers (1697).

Naturally, the care of the sick and wounded was the most crying need at this time, and no formal method of teaching medicine was in vogue, nor, indeed, required. Numerous medical men found their way to New France with the many vessels trading to its shores, some with training equal to the best, some very indifferent, and some, no doubt, little better than quacks. The young colony was, in truth, abundantly supplied.

Under the French régime the practice of medicine was under no special control until 1750, when the Intendant Bigot introduced a regulation "that those wishing to to practise in a city were to be examined before the Physicians of the King in the presence of the Lieutenant-Governor of the Jurisdiction." Those desiring to practise in other places were to pass an examination before the Physician of the King and a sub-delegation. The penalty for infraction of this law was a fine of two hundred francs. Nevertheless, there were many unregistered practitioners in the country.

As was the case elsewhere, so in Canada, the first medical men to be turned out were trained under the apprenticeship system. The first recorded instance of this was when Jean Martinet, Sieur de Fonblanche, appointed surgeon to the Hôtel-Dieu of Montreal in 1681, undertook to teach his brother-in-law, Paul Prudhomme, medicine and surgery. The practice seems to have become more common with time, and apprenticeship was the recognized system during the first fifty years or so of the British régime. Students of medicine were indentured before a notary to the leading practitioners of the day, the more ambitious among them going

abroad to finish their education and obtain diplomas. The period of study was usually four or five years, and the fees were from thirty to fifty pounds.

Until the establishment of formal medical schools the medical men in Canada consisted of some few left over from the French régime, some who were trained under the apprenticeship system, some in civil and military practice who had come over from Britain, and, notably in the case of Ontario and the Maritime provinces, not a few who came to the country after the American Revolution, as United Empire Loyalists.

The earliest efforts to give systematic instruction in medicine belong to the first half of last century, and, as might be expected, were chiefly manifested in the larger centres of population, such as Montreal and Toronto. Alexander Skakel, the headmaster of the Royal Grammar School, Montreal, lectured on natural philosophy as early as 1813; Dr. Andrew Smyth, a retired army surgeon lectured on anatomy and surgery in 1817; and Dr. Sleigh lectured on anatomy, surgery, and the practice of physic in 1819. In Ontario, Dr. John Rolph, a notable figure in the early medical history of Canada, gave private instruction in the art of medicine about 1831. Briefly stated, out of the apprenticeship system grew the private or proprietary medical school, and out of the proprietary school grew the medical faculty of the university.

The first step in advance was made in Montreal, and that noble institution, the Montreal General Hospital, founded in 1818, in no small degree gave the impetus to the establishment of more formal and complete medical education in Canada. Indeed, it was but natural that in a rapidly growing town, of considerable mercantile importance, the necessity for more systematic instruction in the art and practice of medicine should become apparent, and call for the formation of a medical school. Accordingly, in 1822, lectures on the chief subjects of the medical curriculum were given by members of the staff of the Montreal General Hospital, Doctors Holmes, Stephenson, Robertson, and Caldwell. During the next year more adequate steps were taken to organize a

teaching staff, to give lectures, and to utilize the clinical material. This organization took form as the Montreal Medical Institution, which began its work on November 15, 1824. McGill College had been founded in 1821 as the Royal Institution for the Advancement of Learning, but was in danger of going out of existence should it not begin teaching. In this extremity, to their mutual benefit, an arrangement was come to whereby the Montreal Medical Institution became grafted on the College as its faculty of medicine. Thus, on June 29, 1829, was inaugurated the first faculty of medicine to be formed in Canada. The teachers in the Institution became professors in the new College, and their pupils were enabled to obtain at home a degree in medicine. The teaching system was, and still is, based on the Edinburgh plan which lays stress on the clinical side.

About twenty years later (1843), another independent medical school was begun in Montreal by Doctors Arnoldi, Badgley, Munro, McNider, and Sutherland, incorporated in 1845 as the Montreal School of Medicine and Surgery. This, after many vicissitudes, united in 1890 with a branch in Montreal of Laval University of Quebec, and in 1919 was recognized as the faculty of medicine of the University of Montreal, now one of the leading French-Canadian educational institutions.

In Ontario, one of the earliest private establishments for instruction in medicine was that formed at St. Thomas by Dr. Charles Duncombe in 1824. The first real medical school in Upper Canada, however, was the Medical Department of King's College, founded in 1844. It had to compete with the private school of Dr. John Rolph, previously referred to, which was started about the same time and was incorporated in 1851 as the Toronto School of Medicine. In 1850 Doctors Hodder and Bovell founded the Upper Canada School of Medicine, which soon became the medical faculty of the newly established Trinity University, an arrangement, however, which did not last long. Dissension also arose in the Toronto School of Medicine (Rolph's), and in 1856 six out of the seven members of the teaching staff

resigned. The retiring instructors claimed and obtained by decision of the courts the designation of the Toronto School of Medicine, and gave their support to the institution that is now so honourably known as the University of Toronto. The original body filled up its ranks and continued as "Rolph's School of Medicine," becoming virtually the medical faculty of Victoria University, Cobourg. This school finally lapsed after Rolph's death in 1870. A new faculty of medicine was established at Trinity University in 1871, which became independent under charter as the Trinity Medical College in 1877, and, later, in 1903, amalgamated with the medical school of the University of Toronto.

The faculty of medicine of Queen's University, Kingston, was started in 1853, and formally constituted in 1854. Its establishment was directly due to the initiative of certain medical students who were compelled to seek another alma mater when King's College was discontinued in 1853; they then turned to Trinity College, but found that they would be compelled to subscribe to certain religious tests. In the end a medical faculty was established in Queen's, from which they received their degrees in due course.

The other institutions in Canada giving a complete course in medicine are, in order of their establishment as follows:—Laval University, Quebec (1853); Dalhousie University (1868); University of Western Ontario (1878); Manitoba Medical College (1883), incorporated with Manitoba University in 1919; and the University of Alberta (1906), the medical faculty of which was constituted in 1913. There are, therefore, nine universities in Canada equipped to give full instruction in medicine—one in Nova Scotia; three in Quebec; three in Ontario; one in Manitoba; and one in Alberta. In addition, it should be stated, the University of Saskatchewan (1907) has a School of Medical Sciences, established in 1926, in which the first two years of the medical curriculum are taught.

Medical men hailing from across the water will naturally be interested in learning how the training acquired

in Canada compares with that familiar to them. It should be said at once that any differences in the two systems are more apparent than real. Inasmuch as the older schools of medicine in Canada were planned by men trained in the Old Country, and the newer ones were constituted on a similar plan by graduates of these older schools, it is correct to say that the medical tradition of Great Britain, with its insistence on adequate clinical training, has been perpetuated here. This is notably the case in McGill, Toronto, Queen's, and Dalhousie Universities, but is also true of the newer medical schools.

As time went on, not only was it found necessary to lengthen the period devoted to purely professional studies, but it also became clear that medical training should be based on acquirements of rather broad extent. Accordingly, matriculation requirements have steadily increased. Certain differences are to be seen in the attitude of the different universities towards what are commonly called "pre-medical subjects." Some, like McGill, require a minimum of two years of preliminary work, having a strong tincture of science—chemistry, physics, and biology—and some acquaintance with "the humanities," followed by five years of purely professional work. Others, like Toronto, demand "Senior Matriculation" (equivalent to one year of Arts), followed by six years in which the professional curriculum is amplified by certain studies designed to improve general education. One difference between Toronto and McGill lies in the fact that in the former the pre-medical year is given in the medical faculty, whereas in the latter the two pre-medical years are taught in a non-professional school, not necessarily a part of the university. In general, it may be said that every medical faculty in Canada requires for entrance at least two years of Arts, or their equivalent, provided that the requisite sciences have been included. No college at present exacts a B.A. degree, though, it should be noted, a large percentage of the entrants possess this qualification. The pre-medical and medical courses, therefore, no matter how they may be laid out,

demand seven years of study. At the same time, a certain elasticity in practice obtains whereby the authorities do not bind themselves rigidly by the regulations, but may admit promising candidates who may not quite conform to the scheme, but yet possess a sufficient amount of scholarship. Not all applicants, however, can be accepted. A judicious selection is made, and this principle of selection obtains throughout the professional course. Class tests and term and sessional examinations are held, so that it is possible to eliminate early those who are unable to "make the grade." In this way time and money are saved, and the final product is of higher quality.

Licensing for practice is not so simple in Canada as in Great Britain. Here each province has supreme control of education within its own borders, and each province, in fact, with the exception of British Columbia, conducts examinations for licence. British Columbia does not do this, but accepts only the qualification of the Medical Council of Canada. Registration in one province does not always mean registration in another. In some cases a duplication of examinations is avoided by the adoption of the system of assessors. In some provinces examiners representing them sit conjointly with those of the university at stated times, whose duty is to see that the tests are satisfactory, and who may themselves question the candidates at discretion. The certificates of the Medical Council of Canada are, however, accepted by all the provinces, and it is gratifying to find that an increasing number of graduates are sitting for them. The standard of professional attainment set by the Council is high. Two examiners are appointed in each didactic subject, one of whom is a university teacher and the other often is. In the case of the clinical branches one of the two examiners is generally an externe.

The relationship between medical school and hospital in Canada differs from that prevailing in Great Britain. In the latter country the hospitals are for the most part independent; they came first, and established their own medical schools. Where university affiliation has been

effected it is a secondary, rather than a primary, development. In Canada, on the other hand, the reverse obtains. Medical teaching is regarded as a proper element in university effort. In some cases the teaching hospitals are university hospitals. Where they are not the relations between the universities and the hospital boards are close and usually harmonious, and the medical staff of the hospitals are also teachers in the universities. The co-ordination of university and hospital is, therefore, practical and effective. In short, the medical school in Canada is always an integral part of a university, and the university controls the clinical teaching.

RECENT MEDICAL DEVELOPMENTS IN CANADA

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TEMPUS FUGIT. In the twenty odd years since the last visit of the British Medical Association, the development of all phases of medicine in Canada has been so rapid that it is hard to realize how much time has elapsed. Since the war the evolution seems to have become even more rapid. The Canadian and the various provincial Medical Associations have become large and strong bodies. The proprietary medical schools have all disappeared. Instruction in medicine is given only in university faculties. These have undergone great expansions, and in some cases reorganization. Their revenues have increased; teaching facilities have greatly improved; and research has come to be recognized as an essential and growing part of their duties. The author has no intention of being boastful, but the mere recording of these Canadian achievements can not be undertaken without a sense of pride. The visitor will find a widely spread feeling of satisfaction with the solid advances made; but, if he inquires carefully, he will also find that pride is tempered by an ever present critical attitude. Passing visitors and students of medical education from both the Old Land and the United States have passed comments on our teaching and research achievements, some of which have been highly laudatory, and others critical, but both have been received with satisfaction and examined carefully by the recipients. Neither praise nor blame has always been adequately informed.

The Canadian graduates in medicine have earned, in the United States particularly, a general appreciation of

the thoroughness of the training given in medicine in the universities of Canada. In part this recognition is due to the character and previous training of the undergraduates. Primary and secondary education in all the provinces is thorough and good. The foundations for university study are well and truly laid. Not that the training is or has been as perfect as we would like to see. The wide expanses of often thinly settled country have entailed a financial stringency and a limitation of opportunities which has not been entirely overcome.

The course of studies pursued by the student in the universities differs somewhat with the years of study taken in the secondary schools. In Dalhousie and Montreal the medical student is enrolled for one year in the Faculty of Arts; in McGill, Manitoba, and Western Ontario, two years are passed in Arts. During this time the student covers the premedical subjects of physics, biology, and chemistry. In Toronto, Queen's, and Alberta, the student enters with higher matriculation requirements, equivalent to a first year in Arts, and takes his premedical work during his first year. This is also true of the University of Laval. The years of registration in the Faculties of Medicine consequently differ, being six years in Toronto, Queen's, and Alberta, five in McGill, Dalhousie, Laval and Montreal, and four in Manitoba and Western. The period after leaving school spent in study is seven in McGill and five in Laval, six in all the others. Clinical studies are pursued in all cases for at least three years.

Alberta alone has a hospital entirely under its control, though essentially this is the relation borne by the Royal Victoria Hospital to McGill. In all cases the municipal hospitals are closely connected to the teaching schools. In some cases the universities alone nominate the clinical staffs.

McGill and Toronto have by far the largest university staffs and most extensive equipment. They are, however, both burdened by the largest number of students. They are generally considered to be equal in equipment and facilities to the best on the continent or in Great

Britain. Very remarkable strides, however, have been made by all universities. They all have full-time teachers in the fundamental medical sciences—anatomy, physiology, pathology, bacteriology, biochemistry. Pharmacology is in the cases of Alberta and Manitoba included with physiology, and in the French universities Materia Medica is more largely taught. In general, the equipment and courses in these fundamental sciences are less well developed in the French universities, as is the case in France.

The attention of the visitor should particularly be drawn to the rapid developments which have taken place in the Université de Laval and the Université de Montréal, more particularly in the latter, which is wealthier and has received support from the Rockefeller Foundation. Teaching follows closely the procedure in the French universities, with whom the liaison is close, enabling them to obtain frequently French teachers on loan for a year or more. But they have endeavoured to obtain for their fundamental branches, well-trained men from France; for example, Pierre Mason, formerly of Strassburg, well known for his studies of staining technique, is now Professor of Pathology at Montreal. Pariseau, De Lotbinière-Harwood and others of the French professors mingle freely with their English-speaking colleagues, where their knowledge and ability is freely recognized.

Anatomy. The work of McMurrich, Toronto, in embryology and in the applications of embryology to anatomy is well known. Macklin, Western Ontario, has devoted himself to histological studies with a view to their physiological applications, for example, his work on the musculature of the bronchial tree. Watt, Toronto, has contributed to our knowledge of bone formation. J. Cameron, Dalhousie, has been diligent in anthropological studies.

Physiology. The most striking discovery has been that of insulin by Banting and Best in Toronto, which led to a flood of publications on the physiology of insulin by Prof. McLeod and the members of his staff. There is little doubt that the discovery of insulin led to a realiza-

tion of the potentialities of Canadian laboratories and workers not only throughout the world but in Canada. Collip, who aided in the purification of insulin, then succeeded while in Alberta in isolating parathyrin, and has recently in McGill achieved the isolation of one of the female sex hormones, as well as of other remarkable but less important constituents of the body. G. Hunter, Toronto, now Alberta, was forward in the isolation of ergothionine and in the chemical characterization of glutathione. Downs and Eddy, Alberta, have contributed to the knowledge of secretin and splenic extracts and A. B. Macallum, jr., Western Ontario, and his coworkers studied the effects of certain liver extracts which at one time were supposed to be of therapeutic importance. F. R. Miller, Western Ontario, has become well known for his work on the central nervous system, especially the cerebellum and visceral reflex mechanisms. Babkin, Dalhousie, now McGill, has pursued his well-known studies on the digestive glands. Moorhouse, Manitoba, has recently published a most interesting study of tonus in the spinal dog. Tait, McGill, has made important studies on hibernation in animals.

A. T. Cameron's thorough studies of the thyroid are well known and have resulted in stimulating other researches in Manitoba on this subject, *e. g.* that of Wheeler. A. Hunter developed in Toronto a school for the study of protein chemistry leading to important papers on arginine, and the distribution and linkages of the amino acids. Wasteneys and Borsook in his laboratory were able to re-synthetize protein digests. A. B. Macallum organized biochemistry at McGill and has contributed to the theories of ketogenesis. Harding, Toronto, has thoroughly studied the metabolism of pregnancy, especially when toxic symptoms are shown.

In pharmacology in both McGill and Toronto the problems of anæsthesia have been the subject of study. W. Bourne and Stehle have studied the toxic effects of anæsthetics in man and animals, as shown in the disturbances of metabolism and in hepatic function. In Toronto, Henderson, Brown and Lucas have searched

for new anæsthetics and demonstrated the anæsthetic effects of ethylene, propylene and cyclopropane and other gases. They too have studied the fate and toxicity of halogen containing anæsthetics. Webster, Manitoba, Brown, Toronto, and Bourne, McGill, have also made important contributions to practical anæsthesia. Stehle has contributed to our knowledge of kidney function and Henderson to that of intestinal movements and respiration. O. S. Gibbs, Dalhousie, has employed his mechanical ingenuity in the study of kidney function, blood coagulation, and the distribution of quinine.

Pathology. McGill is noted for its splendid Pathological Institute built by Professor Oertel and for its magnificent museum under the care of Prof. Maude E. Abbott, which now houses the Osler collection and where much valuable work is going on. Klotz since his advent to Toronto has further developed his work on arteriosclerosis and aneurysm and also contributed important studies to the pathology of yellow fever. Dr. R. M. Price has studied the importance of bovine tuberculosis in man. Rankin, Alberta, has also produced valuable data on bovine tuberculosis, while Reid, Queen's, has particularly studied the osseous tubercular lesions. Indeed, the whole group of workers who have been studying the questions of bovine tuberculosis for the government have made both individually and collectively an extremely important contribution to the subject. The work of Holman, Toronto, on the results of bacterial associations throws new light on a most important field for the practice of medicine. Boyd of Winnipeg has published a useful book on surgical pathology, and Oertel, McGill, one on general pathology.

Medicine. The recall of Meakins and Howard not only strengthened teaching in McGill, but with the organization of laboratory facilities in the two large hospitals led to a rapid production of important papers, to which E. H. Mason and Rabinovitch contributed. In Toronto the discovery of insulin led to the important fundamental studies of its therapeutic uses by D. Graham, W. R. Campbell, and A. Fletcher. Careful studies in other

clinical fields have been produced by them and others of the staff. The members of the medical staffs in all the Universities are continually contributing practical and useful papers many of which published in the *Journal* of the Canadian Medical Association have aided it to become a valuable source of ideas for the practitioner.

In surgery the most original worker is W. E. Gallie, Toronto, whose experimental and practical work on bone grafting and the use of living sutures has gained world-wide recognition. His recent work on the plastic repair of joint lesions and defects by tendon grafting and the use of living sutures is also of the highest importance. Archibald, McGill, has made important studies of thoracoplasty and of gall bladder and pancreatic disease. Eberts, McGill, has published a thoughtful and valuable book on the surgery of the thyroid based on his personal experience. H. Mackenty, Manitoba, and R. I. Harris may be singled out, perhaps unfairly, as representative of some of the workers in the field of surgery.

It is not unfair to speak of the Hospital for Sick Children in Toronto, the growth and organization of which is unique in Canada. On the surgical side in this Hospital C. L. Starr and W. E. Gallie have been the inspirers of much valuable work and communications; while A. Brown has built up a group of workers whose publications in the sphere of pediatrics are well known.

Toronto was fortunate in becoming the home of one of the Rockefeller schools for Hygiene, with which is united the Connaught Laboratories built up by J. G. Fitzgerald. These laboratories not only supply Canada with toxins, antitoxins, small-pox, and scarlet fever vaccines, antirabic treatments, and insulin, but also are the centre of very active research both into the nature of these products, their production, and use. Further its D. P. H. courses are supplying in an increasing degree the training necessary for government health positions. McGill, too, is devoting increasing attention to hygiene and has developed an excellent group of workers especially in the field of industrial hygiene.

THE INDIANS OF CANADA

By Duncan Campbell Scott, Litt. D., F.R.S.L.

Deputy Superintendent General of Indian Affairs

IT may be conceded that the typical Canadian Indian is the hunter and trapper, and, when one thinks of him, buckskins and beadwork and feathers still cloak him with a sort of romance. But these are rarely seen, except in pageants and on holidays, when the superior race must be amused by a glimpse of real savages in warpaint. The Indian hunter and trapper follows the craft of his ancestors, clothed as you and I, his wife and children likewise. His domestic surroundings grow less and less savage. The rabbit-skin robe yet holds its own, and the snowshoe; but his birch-bark canoe is supplanted by the basswood or cedar variety; as likely as not he has a sewing machine and a gramophone in his tent. The aboriginal hunter is supreme no longer in his own craft; gone is the fiction that he is superior in these pursuits. The white man equals him as a trapper and holds his own on the trail and in the canoe. But as the margin of the wilderness recedes, it is difficult, for comparisons of this kind, to find the Indian of pure blood. There has been through all these years a great interfusion of white blood by lawful union and by illicit intercourse; legally a man may be an Indian with but a small trace of native blood, if his Indian descent is through the male line. If an Indian woman marries a white man, she ceases to be an Indian in the eye of the law, and her children take the status of their father.

For seventy years after the cession of Canada, Indian administration was in the hands of the Imperial military authorities; it was not until 1835 that the responsibility was transferred to the provincial government. The military policy had looked upon the Indians as potential allies or foes, and, during the pioneer days, the feeling was

balanced between hope and apprehension. They were kept quiet by presents of scarlet cloth, silver gorgets, brass kettles, and ammunition, with an occasional ration of rum. The fur-traders used the latter fluid as the most precious means of exchange and barter, and the restless, dejected people that were handed over to the province were indeed a problem. One governor of Upper Canada, seeing them so wretched, resolved to send them back to Nature for healing, and to remove them to hunting grounds where they might recuperate or die away unseen. But better counsels prevailed. The missionaries claimed them as material ready for evangelization, and protested that they were capable of lasting improvement. Upper and Lower Canada, not long after that, began a systematic endeavour to educate the Indians, supported by zealous missionary effort. This informal union between Church and State still exists, and all Canadian Indian schools are conducted upon a joint agreement between the government and the denomination as to finances and system. The method has proved successful, and the Indians of Ontario and Quebec, in the older regions of the provinces, are every day entering more and more into the general life of the country. They are farmers, clerks, artisans, teachers, and lumbermen. Some few have qualified as medical doctors and surveyors; an increasing number are accepting enfranchisement, and taking up the responsibilities of full citizenship.

At least twenty-five per cent. of the Indians of Canada are hunters, and must remain so until settlement filters slowly into their country. Last year the value of fur and fish taken by the Indians of Canada was as much as $2,562,362. Measured by even a low standard, the life of these hunting Indians is not enviable, and a condition almost of slavery exists. By the very circumstances of their lives they are bound to their masters, the traders, and are in a position of debt and obligation that cannot be thrown off. The methods of the hunt are often beset with privation, but the Indian has no longer the old stamina of the race to fall back upon.

The larger portion of the Indian population of Canada is

west of Lake Superior, and it was adopted in a primitive state by the Dominion shortly after Confederation. The aboriginal title to the vast areas east of the Rocky Mountains was extinguished; annual gifts of cash, special reserved lands, assistance in agriculture, and education, were promised by the Government. For a time the Plains Indians had to be fed, owing to the disappearance of the buffalo, but gradually stock-raising and agriculture were introduced and now hardly a pound of gratuitous food is issued.

As an indication of progress, the zero production of grain and livestock forty years ago may be placed side by side with a yield in 1918 of 825,000 bushels and in 1928 if 1,700,000 bushels, and a possession in 1928 of approximately 95,000 head of cattle and horses.

Education

Very early the necessity arose for the education of the natives, and the early missionaries began to instruct the Indians. Early in the nineteenth century schools were established, and it was found that the best results came from residential schools. This has led to a wide development and we have 263 day and 78 residential, in all 341 Indian schools in operation, with a pupilage of 15,347. The department has had the close co-operation of religious denominations in the education of the Indian. The residential schools are conducted by the Anglican, Roman Catholic, Presbyterian, and United Churches. High tribute must be paid to the zeal and self-sacrifice of those engaged in the work, and the effectiveness of our system of joint control has been demonstrated beyond question. Education is free: the government provides the buildings, and pays the managing authorities a *per capita* grant for each pupil in residence. In addition to the regular academic subjects, the girls are taught domestic arts, and the boys agriculture, the care of cattle, and the use of ordinary tools. Considerable success has followed this plan. The graduates are either formed into so-called colonies on their reserves, or are encouraged in making practical use of the knowledge gained at school. Else-

INDIAN PACKERS PORTAGING BAGS OF FLOUR

AN INDIAN TRAPPER'S FAMILY

where day schools meet more nearly the educational requirements. The mental endowment of Indians is hardly inferior to that of other races. We find that where there has been long contact with civilization Indian pupils of the present can compete successfully with white children.

Health

A problem of the utmost importance is the supervision and care of the health of the Indians, subject as they are to tuberculosis and other maladies resulting from their condition of life. The department maintains a large staff of physicians located on or near Indian reserves who administer sanitary regulations and relieve cases of actual sickness. This organization has recently been strengthened by the addition of a medical director, and the creation of a definite medical branch, which is proving of great value in supervising and co-ordinating the various health activities. The influence of the native medicine-man is gradually disappearing; hospitals have been established on the reserves; very general use is made of municipal and provincial hospitals and sanitaria, and the Indians with growing confidence rely upon scientific treatment of disease.

During the summers of 1926 and 1927 a committee of experts under the auspices of the Canadian Tuberculosis Association, carried out for the department a survey of tuberculosis among the Indians of British Columbia, and presented a very valuable report. Their findings agree with those of investigators in other parts of the country and with the observations of departmental physicians. Tuberculosis is about five times more common among Indians than among the general population. Several factors contribute to its prevalence. In many tribes tuberculosis has been comparatively recently introduced, and the resistance possessed by the white race has not yet been acquired. The food supply which would produce in the individual the robust health to enable him to resist invasion by the disease and to cast it off after invasion is not available, nor have the Indians learned in many cases to make good use of the supplies to be had.

Living conditions are far from ideal, and ignorance prevails as to the method of spread of contagion. With the exception of a few tribes, the Indians have not the background of education and experience which would enable them to take full advantage of the knowledge of public health available at the present day.

The problem is a very serious one, but the outlook is not hopeless. Bands of Ontario Indians, who were expected to disappear from this cause some fifty years ago, are now rapidly increasing. The Blackfoot tribes of Alberta, whose numbers were greatly reduced following their infection in the latter quarter of the last century, are now holding their own. The solution of the problem depends as much on the improvement of economic conditions as on medical attendance and public health instruction. The department is using every recognized method of combating the disease, and the situation has shown a definite improvement in recent years. With somewhat increased funds at its disposal, there is reason to hope for more rapid progress in the future.

Trachoma is reported from time to time as existing among Indians. The committee which investigated tuberculosis in British Columbia also interested itself in eye conditions, and from this and other sources of information, it may be stated that this eye disease is very rare among Canadian Indians, if indeeed, it exists at all. There is however, a condition which is prevalent in the mountains and foothills, and occasionally appears elsewhere, which is of importance. It consists of an acute inflammation of the eye, with a small ulcer on the eye-ball, and often leads to impairment of vision. It occurs chiefly among undernourished children, and is probably to a large extent a deficiency disease. The department is devoting special attention to its treatment.

In the remote districts and at certain large reserves the department maintains hospitals for the use of Indians alone. During the past few years new units have been opened at the Six Nations Reserve in Ontario, at the Peigan Reserve in southern Alberta, and at Ile-à-la-Crosse in northern Saskatchewan, where the hospital is a joint

enterprise between the department and the government of Saskatchewan.

In many places hospitals are maintained by church organizations, and the department co-operates by furnishing some equipment and supplies, and in some cases by providing grants of money for building and upkeep. In all parts of the country the services of local hospitals and sanitaria are available for Indians, and a very large use is made of these institutions. Indians are rapidly overcoming their old distrust of hospital treatment, and hospitals are more and more welcoming them as patients. It is becoming increasingly apparent that Indians are as hopeful subjects for modern treatment as white people.

In some remote places the department employs full time physicians and in several instances these doctors furnish the only medical service available for the white population as well as Indians. Seven such positions are maintained, and in four other cases the position of Indian agent is filled by a doctor. For the most part, however, the needs of the Indians are served by the employment of a physician, on part time or on call, who resides near the reserve. There are over two hundred and fifty doctors so employed. The services of specialists in surgery and eye, ear, nose, and throat diseases are retained in large centres for the benefit of Indians in the surrounding country.

There are districts where the Indians are of such primitive and nomadic habits and live over such an extended area that it is impossible to do more than send a doctor once a year to visit them when they are collected to meet the department official who pays the annuity money. The doctor accompanies the paying officer, treats cases of disease, vaccinates the Indians, and gives them simple talks on health and sanitation. In northern Quebec a doctor has been employed for several summer seasons to patrol the Transcontinental Railway, and his work has resulted in a considerable improvement in habits of living among the Indians of the region. Some of the journeys made by these doctors involve great hardship.

The department has maintained for some years a staff

of four travelling nurses in the prairie provinces and of one in Nova Scotia. These nurses make periodical visits to reserves and schools. Their duty is to instruct the Indian women in the care of children and home-making in general, to examine school children for defects, and to report cases of defect or illness to the Indian agent and physician. In some instances these nurses have been able to hold very successful clinics to which the Indian mothers bring their babies for inspection and advice. In British Columbia two resident nurses are maintained and in Alberta one. The work of these nurses is very satisfactory, and it is hoped that it will be possible to extend the service. On one reserve where infant mortality was unusually high, an enormous improvement followed the installation of a resident nurse.

In places where the number of Indians is not large enough to justify the employment of a more highly skilled worker, the services of a neighbouring white woman are retained as a field matron. These women have usually the advantage of the advice of a physician, and in some cases of visits from the travelling nurses. Some of them possess considerable nursing experience, but their main function is to give instruction and advice in housekeeping and the care of children.

The department is also making a beginning in the way of co-operation with the various provincial and voluntary organizations which maintain district public health nurses. In some cases the assistance of the department makes it possible for a district nurse to be employed in a municipality to the mutual advantage of both the Indians and the white people there.

Every residential school, except a very few where such service is not available, has the advantage of the regular oversight of a physician, and in many cases the pupils' health is cared for by a resident nurse. Pupils in day schools are examined by agency physicians and travelling nurses. This service is capable of further development, and it is hoped that it may soon be possible to have a system of regular inspection of every Indian school pupil. All candidates for entrance to residential schools

are examined before admission, particularly for the presence of active tubercular disease. Drugs and surgical supplies are furnished to principals of residential schools, and a considerable expenditure is made for the remedy of physical defects such as eye conditions and diseased tonsils and teeth which would tend to retard the studies of the pupils or make them subject to the invasion of tuberculosis.

Epidemics of communicable disease arise from time to time on Indian reserves. The department has, during the past few years, devised a set of regulations for the control of these diseases which promises to be of great advantage. Constant effort is put forth to keep vaccination against smallpox up to date, and a beginning is being made towards immunization against diphtheria.

Although the department is sometimes handicapped in the beginning of an epidemic by the reticence of the Indian, it has an advantage over white communities in the matter of the possibility of enforcing regulations once the outbreak is discovered. In a recent outbreak of smallpox practically every Indian was vaccinated within one week after the diagnosis was established, a procedure which would be difficult to carry out in any white Canadian community. The services of travelling nurses are of value in epidemics, as they are at once available for duty in such emergencies anywhere in the district which they cover.

The Department of Indian Affairs has ground for reasonable satisfaction with its medical service from a remedial standpoint. No appeal for medical treatment from a Canadian Indian goes unheeded, and no expense is spared to give the sick Indian the benefit of the best medical and hospital care available. There is, however, a vast field of preventive medicine which would yield a rich harvest in improved health and economic efficiency of Indians. It is the aim of the department to extend greatly the preventive side of its effort, but such action must await the provision of increased funds, and, to some extent, the awakening of interest in Indian health, on the part of both the Indians themselves and the general

public, in the one case toward the support of the government in making increased expenditure, and in the other toward the realization of the need for improvement.

Indians in the Great War

The Indians of Canada may look with just pride upon the part played by them in the Great War both at home and on the field of battle. They have well and nobly upheld the loyal traditions of their gallant ancestors who rendered invaluable service to the British cause in 1776 and 1812, and have added thereto a heritage of deathless honour which is an example and an inspiration for their descendants. According to the official records of the department more than 4,000 Indians enlisted for active service with the Canadian Expeditionary Forces. This number represents approximately 35 per cent. of the Indian male population of military age in the nine provinces.

British Columbia

The situation of the British Columbia Indians is unique. They were a mountain and sea people, gaining subsistence from the game of the Rockies or from the salmon fisheries. Their feuds were of even a more bitter character than the animosities of the Plains Indians, and turbulent times were common amongst them. No native craft has ever equalled their sea-going war canoes. Their domestic arts were highly developed; and their basketry, beautifully wrought and ornamented, is still the admiration of our museums. Their domestic utensils were carefully worked and ornamented with characteristic design, and their waterproof garments, woven from the bark of trees, showed an extraordinary adaptation of natural means to an end.

Anthropologists have found in their myths and religious ceremonies an inexhaustible field for investigation, and volumes have been written in elucidation of their manners and customs. Civilization also came to this people not in the guise of an evangel, but with a sinister aspect. It struck at the very root of the tribal existence. For years the women were sacrificed to the licence of the white

men of the coast, often with the connivance of the native males; disease and whisky worked swiftly, and destroyed them. After these staggering blows the race is only now beginning to recover. A population which was variously estimated at from 40,000 to 50,000 in about the year 1871, when British Columbia came into Confederation, has now dwindled to 25,107. Nowhere in Canada are the Indians a greater factor in the labour market than in this province. They are the mainstay of the fisheries of the Fraser and Skeena Rivers. The labour of the women is valued in the fish-canning factories, and an Indian fisherman is always sure of employment if he has a number of women who can be useful in packing the fish. The men themselves are excellent fishermen, but not without the usual native failing, lack of steadiness. They are excellent boat-builders, and can readily manage gasoline boats and engines. In the high and lonely parts of this wonderful province there are Indians who are as primitive as those met by Captain Vancouver.

Although no cession of the Indian title in British Columbia has ever been sought or obtained, the provincial government has set apart adequate reserves, and the Dominion government has extended to the natives the same system of education, agricultural assistance, and administrative supervision as in the prairie provinces. Many of the reserves are suitable for stock-raising, and some Indians have been successful in breeding cattle and horses, while in other localities fruit culture and the cultivation of beans and peas offers suitable employment. The outlook in British Columbia is certainly encouraging; there is fine material among the natives to make good British citizens, and in two or three decades we may expect that a large number of Indians will have been absorbed into the ordinary life of the province.

Population

The Indian population of Canada is fairly stable at about 108,000. Among the less civilized groups, the high birth-rate balances the high death-rate; but in the civilized tribes, who have withstood the first shock of

contact with civilization, there is an appreciable gain, not only in numbers, but in physical standards. These latter people have long ago proved their worth, and only need to develop and mature under protection until they, one and all, reach their destined goal, full British citizenship.

CANADA'S NATIONAL PARKS

By J. B. Harkin

Commissioner, National Parks of Canada

CANADA has a very extensive system of National Parks, aggregating a total area of over 13,000 square miles. This great area—larger than the principality of Wales, twice the size of the county of York, and more than one-third the extent of Scotland—comprises sixteen reservations and some of the most remarkable scenic regions in the Dominion. In the words of the Act of dedication these reserves have been set aside by the federal government for the "perpetual use, benefit and enjoyment of the people". They constitute an important recognition on the part of the government of the great principle which is coming to be more and more widely recognized throughout the civilized world—of the public right of access to and ownership of natural scenery of unique attraction. These great reservations form, too, an interesting expression of Canada's developing sense of national consciousness, and are an evidence of her instinctive, but growing "love of the land."

Since the establishment of the first Canadian National Park in 1887, the conservation of such areas for public use has received the sympathetic endorsement of the best humanistic culture in Canada, and especially of the fellowship of scientific men who see in these National Parks the only real and unspoiled museum for the study of natural history. While they offer the most exhilarating opportunities for outdoor life for the multitude, they also conserve exhibits of the original wild life of Canada, supported under absolutely natural conditions, and they maintain the primitive wilderness as the early explorers saw it hundreds of years ago.

On the North American continent the term "National Park" has come to have a special and clearly recognized significance, and this in spite of the fact that it is used to cover several kinds of reservations. In its broadest meaning a National Park is a public reservation of land which for one reason or another is of common national interest. Such reserves vary in Canada from great regions characterized by outstanding scenic beauty or unique phenomena of nature to small areas preserving sites memorable in the national history or bearing remains of aboriginal occupation.

With the advance of industry and commerce and the increasing power of wealth there has been in all countries needless destruction of natural beauty and wild life, and widespread alienation of scenic areas from the enjoyment of the people. Canada was fortunate that, when the necessity for the conservation of such places began to be apparent, she still possessed vast areas where primitive and unspoiled conditions prevailed, and has accordingly been able to make generous provision for her probable future needs.

Development

The development of the National Parks movement has been a gradual growth covering a period of a little more than two score years.

Canada's first reserve, Rocky Mountains Park, of which Banff is the centre, was established in 1886, almost immediately following the completion of the Canadian Pacific Railway across the continent. The construction of the line through the Rocky Mountains opened an area of such wondrous beauty and grandeur that practically everyone who saw it declared it should be preserved intact for the enjoyment of future generations. Action was promptly taken by the Canadian parliament, and in 1885 the first reservation was set aside in the vicinity of Banff. This was followed the next year by other reservations in the neighbourhood of Lake Louise, Field, and in the heart of the Selkirks. Later the Banff reservation was enlarged so as to include the Lake

Louise region, and the other two reservations became known respectively as Yoho and Glacier Parks. From time to time other areas have been added both in the mountains and in other parts of the Dominion, and to-day the system is continent-wide.

It was soon obvious that tourist traffic to the parks would be sufficiently important to make the National Parks an economic factor in the prosperity of the country and to give them a rightful place in any list of natural resources.

But the purpose of the National Parks that appeals most to the general public is to provide large areas of magnificent natural scenery as a refuge from the pressure of modern business life, a way of escape into regions of natural beauty for the renewal of bodily strength and the re-awakening of those spiritual interests which have so much to do with the sustained happiness and energy of life.

Conservation of Wild Life

All the National Parks are maintained as wild-life sanctuaries. Within their boundaries no wild animal may be hunted or destroyed. Within the past few years these reserves throughout Canada have come to form breeding-places for many kinds of wild life, and the surplus is now beginning to spread beyond their borders and to re-stock the surrounding districts. The absence of persecution or violence of any kind has also freed the animals from the fear of man, and they have become noticeably tame. Deer and even bear approach within a few yards of human habitation, and readily allow themselves to be fed, while Bighorn sheep will permit visitors to come within camera range. The pleasure of being able to establish such close contact with beautiful wild creatures and to have the opportunity of photographing or studying different species in their native haunts has now become one of the great attractions of the parks. For an increasing number it is proving more satisfying than the instinct for the chase.

Animal Parks

Out of the impulse to preserve examples of original conditions have grown as a natural consequence the special animal parks which exist for the protection of nearly extinct native animals, such as buffalo, elk, and antelope. All National Parks, wherever they are found, are wild-life sanctuaries, but the seven great scenic reservations in the Rockies need only adequate patrols to achieve their ends. There is no surrounding settlement to complicate the situation. But the buffalo and antelope have their habitat on the prairie, and the prairie is now almost entirely settled so that the homes of these species have disappeared. To afford them protection it was necessary to create large fenced enclosures in which they could thrive and propagate under natural conditions without encroaching on the land of settlers. At Buffalo Park, Wainwright, Alberta, within an extensive fenced enclosure of 197 square miles may be seen a large herd of buffalo living under conditions practically identical with those enjoyed by the species when the white man first invaded their feeding grounds. From the original stock of 700, obtained sixteen years ago, there is now a herd of over 5,000, and surplus stock is being utilized for buffalo meat and robes, which have been placed on the market. Successful operations have also been carried out in cross-breeding the buffalo with domestic cattle with a view to producing a new type of animal which will be adapted to the severe winters of the Far North. Over 6,000 buffalo from this herd have also been shipped to the Far North and liberated in that vast unoccupied region to the south and east of Great Slave Lake, which it is hoped will eventually be re-stocked with this valuable species of native game.

A smaller park known as Elk Island Park, also containing buffalo and elk, lies within a couple of hours' motor ride from Edmonton.

At Nemiskam, in southern Alberta, there is a reserve for the protection of antelope where a flourishing herd of these nearly extinct animals may be seen.

SUNSET, KINGSMERE LAKE, PRINCE ALBERT NATIONAL PARK

Courtesy of the National Parks Branch

LAKE LOUISE, BANFF NATIONAL PARK

Courtesy of the National Parks Branch

HELL ROARING CANYON FROM TOP OF VIMY MOUNTAINS, WATERLOO LAKES NATIONAL PARK

Courtesy of the National Parks Branch

MOUNT ROBSON, JASPER NATIONAL PARK

Courtesy of the National Parks Branch

MOOSE, ELK ISLAND NATIONAL PARK

Courtesy of the National Parks Branch

BUFFALO, BANFF NATIONAL PARK

Courtesy of the National Parks Branch

Historic Sites

In addition to the maintenance and development of scenic and animal reserves the work of the National Parks involves the preservation, restoration, and marking of historic and prehistoric sites throughout the Dominion. Where the title to these historic places remains in the hands of the government, the site is usually handed over to the parks administration; and where the title is in private hands, steps are taken either to acquire the site or or to mark it in a suitable manner. As this work requires expert historical knowledge covering the whole of Canada, an advisory board of eminent Canadian historians has been appointed. This board serves without remuneration, and meets periodically to discuss the general aspects of the work and to advise the department in specific cases.

Administration

The National Parks are administered by a special branch of the Department of the Interior presided over by an officer known as the commissioner of the National Parks of Canada. The reservations are made under a special Act. This Act removes all parks from under the operation of any other kind of Act. It is, therefore, necessary to draft regulations providing for the control of every kind of undertaking within the parks as well as to create machinery for the adequate enforcement of such regulations. No land is sold except for railway purposes but leases are granted for business or residential purposes for a term of years at a nominal rental. In order to preserve architectural harmony all plans for buildings must be submitted to the head office for approval.

There are nearly 400 miles of motor roads and 2,000 miles of trails in the whole Canadian National Parks system. While the parks are kept in their primitive condition, and thus carry a much wider connotation of the term "park" than is customary, there is ample accommodation for tourists, at central points, of the most modern kind. The first hotels built were of the massive and luxurious order familiar in European resorts;

but, of late years, the simpler bungalow hotel has come into favour; and, still more recently, wayside camps for motorists—providing such facilities as electric light, water, sewers, community kitchens, and baths—have been constructed to meet the necessities of tourists of limited means. The whole intention of the administration is to bring the recreational possibilities of the parks within reach of the people. For Alpine climbers the Rockies afford new ground for exciting exploration, with the additional incentive of an opportunity to make fresh climbs or to break new routes.

It is impossible to describe in the space here available all the attractions of the national scenic parks; but the following brief description may indicate some of their main characteristics.

Rocky Mountains National Park

Rocky Mountains National Park, with an area of 3,961.50 square miles is in the province of Alberta, on the eastern slope of the Rocky Mountains. It is traversed by the main line of the Canadian Pacific Railway and by through motor highway. The scenery is characteristic of the east slope of the Rockies—rugged mountain ranges extending in parallel ranks north and south for nearly one hundred and fifty miles, and containing many regions of surprising alpine loveliness and grandeur. Mr. Scott O'Connor, an English writer, says of this park:—

> Nowhere on the face of the earth are there more kingly mountains; nowhere is there architecture more fantastic and grim. The Dolomites alone resemble this world in which beauty and tragedy are combined as in a Greek play. Thousands of feet of mountain stand up from precipitous cliffs, and sustain at their summits these cloud-capped fortresses and castles that are the wonder of the Canadian mountains.

Animal life is abundant, and the park is especially noted for its wild Rocky Mountain or Bighorn sheep which roam everywhere through the reserve. Deer, elk, and bear have lost their traditional fear of man. Unmolested and unmolesting they live out happy lives in this animal paradise.

The picturesque town of Banff is the seat of adminis-

tration. From it radiate roads and trails in every direction and to every point of interest. Adjacent to the town are the celebrated hot sulphur springs, the therapeutic constituents of which are almost identical with the well-known springs at Bath. In this park, too, is one of the most delightful golf courses in Canada. Lake Louise ("the Pearl of the Rockies", as it has been called), Paradise Valley, Moraine Lake in the majestic Valley of the Ten Peaks, are among the outstanding places of beauty and interest. In the northern part of the park lies a vast and little known region containing a bewildering array of snowpeaks, ice-fields, and glaciers, including the southern half of the great Columbia *mer de glace*.

Yoho National Park

Yoho National Park in British Columbia, adjoins Rocky Mountains National Park at the boundary line between the two provinces and is accessible by Canadian Pacific Railway and motor highway. Field is the seat of administration. Emerald Lake, seven miles from the town, is the main headquarters for tourists and the centre from which the many attractions of this magnificent region may be visited. The park has an area of 507 square miles and is situated on the roof and western slope of the Rockies. Yoho is the Cree Indian word for "wonderful!" By the happiest inspiration it was adopted as the name of the park. The attractions of this park, beyond the ever-present glory of its mountains, are the exquisitely beautiful Lakes O'Hara and Emerald, and the Yoho Valley with its numerous and fine waterfalls, its wealth of green and rugged barrenness and its majestic line of peaks. Snow and ice are present in every form, smooth and easy or torn with deep crevasses and splintered into daring seracs. Of all the lovely visions in the park the Takakkaw Falls (Indian word meaning "beautiful") are perhaps the most striking. The falls are more than five times the height of Niagara. Five miles farther up the valley are the Twin Falls: a phenomenon as beautiful as it is unexpected. All along both sides of the valley other cascades are seen plunging down in translucent streaks, the most

fascinating of which are the Laughing Falls—another case of happy christening. Excellent roads, and good trails make travel through the Yoho Park comfortable and delightful.

Revelstoke National Park

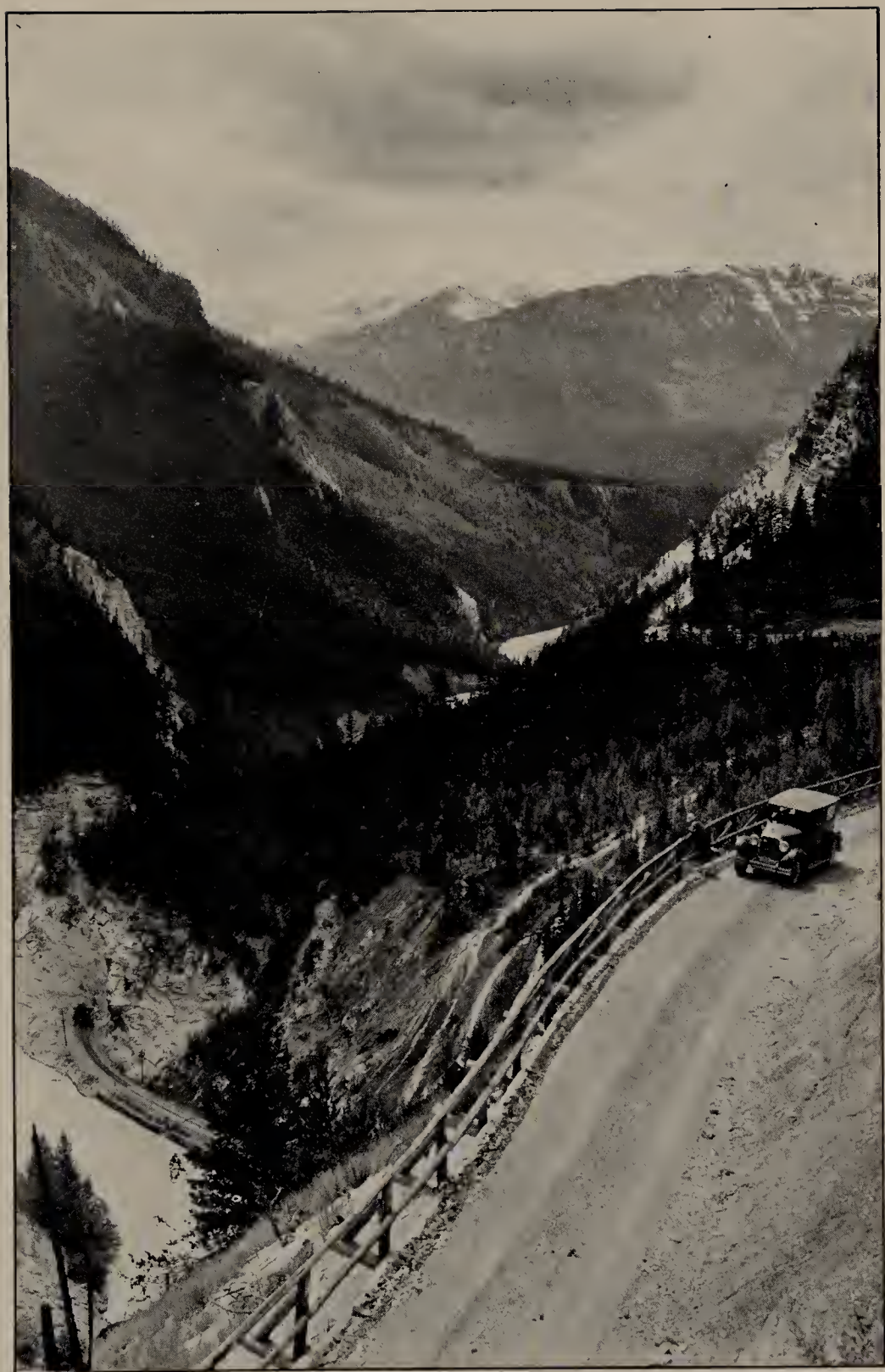
Revelstoke National Park, 100 square miles in area, in British Columbia, forms the last link westward in the chain of National Parks in western Canada. The town of Revelstoke, on the Columbia River, is the seat of administration. Mount Revelstoke, 7,000 feet high, behind the town, is in the centre of the park. On the top of this mountain is a level park-like plateau of over 2,000 acres. Revelstoke Park was dedicated in 1919 by his Royal Highness the Prince of Wales, on the occasion of his visit to the town. A motor drive of about eighteen miles up the mountain brings one to the park. The scenery as viewed from the top of the mountain is grand and expansive, and the plateau itself is a natural park with rolling, flowered uplands, studded with irregular groves of spruce, fir and hemlock, and several exquisite lakelets. The valleys of the Columbia and Illecillewaet to the south and west open up splendid vistas.

Kootenay National Park

A few years ago the Dominion Government constructed a modern motor highway across the Central Rockies by way of Vermilion Pass. Its eastern terminus is Banff, its western a point in the Columbia Valley near beautiful Lake Windermere. From Banff to Vermilion Pass the road lay through Rocky Mountains Park, in a region whose natural wildness and beauty was inviolably preserved. The region west of the pass was virgin country and in order to protect its attractions and preserve the character of the highway through its length, it was decided to set aside a strip of five miles wide on each side of the road and to declare it a National Park. The motorist through the mountains may, therefore, drive for over one hundred consecutive miles through National Park territory. Kootenay Park, as this reserve is called,

TWIN FALLS IN YOHO VALLEY, YOHO NATIONAL PARK

Courtesy of the National Parks Branch



KICKINGHORSE CANYON, SELKIRK RANGE, YOHO NATIONAL PARK

Courtesy of the National Parks Branch

contains scenery of high order including the famous Marble Canyon and Radium Hot Springs, which are among the highest in radium activity on the continent.

Waterton Lakes Park

Waterton Lakes Park, in the south of the province of Alberta, adjoining the United States Glacier Park at the international boundary, has an area of 220 square miles. This is also a land of peaks and precipices, of rushing rivers and deep canyons, waterfalls and lakes of great loveliness. Upper Waterton Lake is nine and a half miles long, three and a half of which are in the United States. It is a remarkably beautiful sheet of water, famous for its fishing. The scenery here is not truly Alpine, as no glaciers or snowpeaks abound; but it is doubtful if there is any portion of equal area on the American continent where nature has so concentrated her wonders and beauty. The valleys are dotted with park-like glades clothed in summer with a profusion of glowing wild flowers and filled with the pleasing moist and fragrant odours of the forests. The main valleys have been gouged out in times past by heavy flows of glacier ice from the mountains; and the streams flowing through them, as they plunged from their cloudcapped sources, have worn out great semi-circular basins and cut out deep canyons through the softer parts of the rocks.

Jasper National Park

Jasper National Park, in the north of the province of Alberta, is the largest of all the Canadian National Parks, with an area of 4,505 square miles. It is reached from the east and west by the Canadian National Railway lines. The little town of Jasper, in which are the administration buildings, is two hundred miles west of Edmonton, the political capital of the province. No portion of the west country is richer in romance or has more interesting historic associations. A charming bungalow hotel, situated on beautiful Lac Beauvert, and one of the best golf courses in Canada, both under the management of the Canadian National Railways, add

to the attractions of the park. The Athabaska Valley, through which flows the Athabaska River, extends through the entire length of the park. Good motor roads and over 400 miles of trails give access to a score of interesting regions; many others are as yet unmapped and almost unknown.

The entire region is characterized by wild grandeur, with majestic peaks which tower above the continental watershed and numerous glaciers feeding rivers flowing to three separate oceans—the Athabaska flowing to the Arctic, the Saskatchewan to the Atlantic, and the Columbia to the Pacific.

Prairie Parks

There are two National Parks on the Prairies—Prince Albert Park in Northern Saskatchewan and Riding Mountain Park in Manitoba. Prince Albert Park reserves a beautiful lake and woodland country specially noted for its maze of connected waterways. Starting at Waskesiu Beach, the park headquarters, one may take a canoe for literally hundreds of miles, reaching on the east Hudson Bay, on the west and north the Great Mackenzie which flows into the Arctic Ocean.

Riding Mountain Park has only recently been set aside. It is expected that it will be formally opened to the public some time during the present summer.

Eastern Parks

In the province of Ontario there are three reservations —Point Pelee Park, a small area at the most southerly point of Canada, which presents many interesting forms of bird and plant life—and two groups of island reservations among the beautiful "Thousand Islands" of the St. Lawrence River and the so-called "Thirty Thousand Islands" of the Georgian Bay. Both of these are popular tourist regions where the land is in great demand. To ensure that the public will always have places in which to camp and picnic a certain number of islands in both regions have been set aside as National Parks.

PRINCE EDWARD ISLAND

By the Hon. A. C. Saunders, K.C.

Formerly Prime Minister of Prince Edward Island

"ALL the land is low and the most beautiful it is possible to see and full of beautiful trees and meadows . . . This is a land of the best temperatures." Thus Jacques Cartier described Prince Edward Island when he came across it in the closing days of June, 1534. While settlement and cultivation have wrought inevitable changes, they have also further enhanced those features that give the Island Province unique individuality and characteristics that are not only attractive but exceptional. The crescent-shaped little island, the smallest of the Canadian provinces, is a land of scenic and climatic attractions. Its aboriginal name, "Abegweit" (Cradled-on-the-Wave), is still most appropriate and fitly describes it as it nestles near the south side of the Gulf of St. Lawrence in a bay formed by the concave coast line of New Brunswick and Nova Scotia. While there is no romantic boldness, the scenery is everywhere pleasing. The peculiar redness of the soil, which always attracts the attention of the visitor, forms a strikingly effective contrast to the rich and varied green of field and woodland, while on every hand are to be seen comfortable farm houses, groves, orchards, fertile fields and grazing cattle—scenery in many aspects suggestive of England.

While there are strong claims that Prince Edward Island was discovered by John Cabot in 1497, opinion based on recent researches would seem to indicate that it was first discovered in 1534, by Jacques Cartier, who thought it was part of the mainland. When its separate entity was established it was given the name of Isle St. Jean (St. John Island), and it was known by this name until 1799, which it received its present name after

Prince Edward, Duke of Kent and father of Queen Victoria. Upon the fall of Louisbourg in 1758, the British took possession of the Island, and their possession was confirmed by the Treaty of Paris in 1763. It was annexed to the province of Nova Scotia, but in 1769 was given a separate government. After its cession to the British the Island was surveyed and divided into three counties—King's, Queen's, and Prince, with a subdivision into sixty-seven townships or "lots" of approximately twenty thousand acres each.

While Prince Edward Island did not join the Dominion until July 1, 1873, it is notable as the cradle of Confederation, for at a conference at Charlottetown on September 1, 1864, primarily called to consider the project of a union of the Maritime provinces, the representatives of all the provinces met in the first of the conferences which resulted in the confederation of the provinces into the Dominion of Canada.

One of the outstanding characteristics of Prince Edward Island is its ideal summer climate with its clear skies, sunny days, and cool nights. Its remarkably health-producing qualities make the Island a favorite resort for tourists. The heat is not oppressive, seldom reaching 80° F., and is always tempered by the fresh, invigorating breezes from the waters of the surrounding Gulf. Sheltered from the Atlantic by Cape Breton Island and Newfoundland, it is almost entirely free from fog.

Prince Edward Island is the most densely settled province of Canada with a average of 40.6 persons per square mile. The latest census—1921—showed that it had a population of 88,615, of which 78.5 per cent. lived in the rural parts as compared with 50.5 per cent. for the whole of Canada. Persons over seventy years of age form more than 6 per cent. of the population, a percentage much higher than that of any other province. This longevity is attributed in part to the vivifying air and tranquil life of the Island.

Over 97 per cent. of the whole population is Canadian-born, being descended from the original English, Scotch, Irish, and French settlers. Those settlers form separate

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communities and for a long time each maintained the traditions and customs of their race, These racial distinctions have now largely passed away, although the French in some localities retain to a great degree their national characteristics. Of the present inhabitants the Scotch or their descendants are the most numerous, forming 37.7 per cent. of the population. The English, Irish, and French form 26.3, 21.1, and 13.5 per cent. respectively.

The farmers of Prince Edward Island have well heeded the old adage: "Don't put all your eggs in one basket." Agriculture here finds its expression in diversified or mixed farming, and the province takes a leading place in the variety and excellence of its products. Dairy products, beef, wool, lambs, bacon, hogs, poultry products, foxes, seed potatoes, seed grain, and fruits are among the Island's major sources of income. The various names by which the Island is known attest to the place given to agriculture: "The Million Acre Farm," owing to the large proportion of arable land; "The Garden of the Gulf," from its great productivity; and "The Denmark of Canada," from the prominence given to dairying.

Over 87 per cent. of the area is under occupied farms, and farming affords a direct livelihood for three-fourths of the population and indirectly for a large percentage of the remainder. The average size of farm is 88.8 acres. Of the 13,701 occupied farms 94.3 per cent. are occupied by the owner and only 2 per cent. by a tenant, the remaining 3.7 per cent, being occupied by a manager or by part owner and part tenant.

The estimated value of lands, buildings, implements, live stock, poultry and animals on fur farms is $66,000,000. The value of agricultural products is nearly $24,000,000, of which field crops make up about 65 per cent., dairy products 14 per cent., poultry products 5 per cent., and fur-farming nearly 7 per cent.

Much attention has been given in this province during the past four or five years to the production of certified seed potatoes, which means potatoes grown under rigid

field inspection and the tubers carefully graded that the purchaser may have potatoes that will reproduce with the least possible loss from constitutional diseases in the growing plant and tubers that will cut without loss from bruises, scar, or rot. Certified seed potatoes sell in the southern United States and other markets at relatively high prices. With the adoption of improved varieties, with graded selection and propagation, with protection against blights and insects by spraying, and with a good system of government inspection and certification, the Island's splendid seed potatoes have already established great possibilities of an extensive market for themselves, particularly in warm countries where, on account of climatic conditions, it is necessary to change the seed every two years or oftener. Seed stock is already commanding a large share of the potato crop that leaves the province.

The education necessary for growing certified seed has spread until now there is scarcely any farmer who is not directly interested in better seed, better cultivation, efficient spraying, increased production, sound potatoes, and wider and more profitable markets. The attainment of these excellent results has been largely due to activities carried on under the auspices of the Prince Edward Island Potato Growers Association. This Association has been the means of reducing the cost of production by buying and distributing fertilizers, poison and spray materials. It also affords marketing facilities for the crop. The varieties grown are improved strains of Irish Cobbler and Green Mountain. In 1929 the province produced 21,000 acres of certified seed potatoes, or 80 per cent. more than the rest of Canada.

Dairying has long held a prominent place in the agricultural industries of Prince Edward Island and dairy products are among its largest items of export. All dairy products for export outside of Canada must be graded, and uniform high quality is necessary in order to meet keen competition in foreign markets. Ayrshire and Holstein breeds are the two most popular dairy breeds

THE LEGISLATIVE BUILDINGS, CHARLOTTETOWN, PRINCE EDWARD ISLAND

on the Island, and are found in about equal numbers, together with a few herds of Jerseys and Guernseys.

An advance step of the greatest importance to the live stock industry of Prince Edward Island was taken in 1925 with the adoption by the farmers of the province of the restricted area plan for the eradication of bovine tuberculosis. It had been recognized for some years that the Island on account of its size and geographical position offers very favourable opportunities for the application of such a scheme. Under the provisions of the Federal Act governing the formation of restricted areas, two-thirds of the votes of the farmers in the area must be favourable to the plan. During the spring of 1925 organized efforts secured an almost unanimous vote of the farmers of the province in its favour, and action was at once taken to put the plan into effect. Veterinary inspectors systematically covered the province, and completed the testing of the herds with promptitude. Cattle that reacted to the test were condemned and slaughtered. A particularly satisfactory feature of the test and one that showed the comparative freedom of Island cattle from disease was the fact that only slightly over one-half of one per cent. were found to be infected. In a subsequent re-test of the infected herds only three diseased animals were found. With such a splendid record and with the whole province now in a position of being wholly free from bovine tuberculosis, the purity of Prince Edward Island's milk, butter, and cheese is further enhanced, and the breeders of the province occupy a unique and enviable position in the market with their surplus live cattle, breeding stock, meat, and dairy products.

The rearing of wild, fur-bearing animals in captivity for their pelts has been carried on for a number of years in Canada, but while other animals have been tried and in certain cases can be raised with some degree of profit, the silver black fox is not only easily reared, but gives much greater return, and to-day it forms nearly 97 per cent. of the value of domesticated fur-bearers in Canada. The name of Prince Edward Island is indelibly associated

with the pioneer efforts to domesticate the fox, and with those epoch-making experiments which were successful in raising true to type that superior species known as the silver fox there was laid the basis of a great Canadian industry. Though fur-farming has extended into every province of the Dominion, Prince Edward Island still holds first rank in the industry, and its breeding stock forms the nucleus of the vast majority of Canadian fur ranches and has also gone abroad to establish ranches in the United States and other foreign countries, including Scotland, France, Norway, and Japan.

A short description of this development may be interesting. Two men, Charles Dalton and Robert T. Oulton, are credited with being the first successful pioneers in raising silver foxes in captivity and placing the industry on a commercial basis. Dalton began his experiments at Tignish about 1887. When it became known that the lustrous and rare pelts from the ranches of these two men brought exceedingly high prices at the London fur sales, much interest was aroused and others were desirous of engaging in the business, and by 1909 a number of farmers in the vicinity of Alberton were engaged in fox-farming.

Up to this time silver fox breeding in Prince Edward Island was practically a monopoly enjoyed by a few breeders, the profits being such that they were reluctant to enlarge the field of competition by the sale of breeding stock to others. The insistent demand of the public to engage in the business could not, however, long be denied, and the year 1912 saw a general increase in the number engaged in the industry. At this time the promoter made his appearance, speculation ran riot and prices of breeding stock rose to an unprecedented degree, as much as $35,000. being paid for a pair of breeders.

The outbreak of the war brought a decline in prices and in the demand for pelts, and the result was the failure of a number of companies engaged in the industry due, in most part, to unsound financing. The reverses of this period resulted in measures of re-construction, and the industry, re-established on a sounder basis by reason of a truer appraisement of commercial values, survived the

A SILVER FOX

A PRINCE EDWARD ISLAND FARM

war and financial depression and is again asserting its importance by steady and substantial development. Owing to lower prices of the pelt in recent years the total value of animals is, however, less.

The principal market for silver fox furs up to the outbreak of the war has been in Europe, but after hostilities began the silver fox breeder sought a small market in the United States, where sales had hitherto been comparatively small. Despite the recent heavy duty levied by the United States on imports of silver foxes and their pelts, there is still an increasing demand in that country for Canadian silver fox stock. Ranch-bred silver fox furs are an important item at the Canadian fur-sales at Montreal, and there are also indications of a marked revival in the European market for these furs. Large sales of live foxes for foundation stock are made to the New England States and to central and western United States and Canada which, coupled with the shipments to England, Scotland, Norway, Sweden, France, Germany, Switzerland, Cuba and other countries, indicates the wide distribution of Prince Edward Island pure-bred stock.

The permanence of this industry is well assured. Both soil and climatic conditions in Prince Edward Island are peculiarly adapted for the production of fine furs. The industry is now on a sound commercial footing and is fast becoming a branch of mixed farming, many farmers adding a few pairs of foxes to their present farming stock and thus making a new earning department. Success depends largely on procuring proven breeding stock of high quality and proper type from a fur-trade point of view at a price as near to a pelt basis as possible, and on skilful care and feeding.

The fisheries of Prince Edward Island are of considerable importance, the annual value being about one and one-half million dollars, chiefly derived from lobsters, oysters, cod, mackerel, herring, and smelts. Salmon are caught in some of the streams, while brook trout and sea trout afford excellent sport for both fishermen and visitors.

In this province by the sea there is neither great wealth nor poverty, but rather a happy contentment which pervades the homes of the highest and lowest. The forefathers of its people came here in some cases upwards of one hundred and fifty years ago, courageous men and brave women who, daring to be pioneers, brought with them the traditions of Sunny France, Merry England, Bonny Scotland, and the Emerald Isle.

Prince Edward Island welcomes you to her shores. The latchstring of hospitality is never withdrawn. It matters not whether you come to us in search of business or upon vacation bent; in pursuit of rest and quiet or to reside permanently amongst us; to become Islanders and to call the Island your home—we welcome you most sincerely and wish you all the best that our fair province affords.

NOVA SCOTIA

By the Hon. E. N. Rhodes, K.C., D.C.L.

Prime Minister of Nova Scotia

NOVA Scotia, the Atlantic province of Canada, has played so large a part in the development of the Dominion that its name means much more than the distinguishing title of a portion of land. It is the oldest portion of Canada. Both the French and the English recognized it as the key to the ownership of the new world. It was now in the hands of the French, now of the English, and ineffaceable traces of each remain. Historic scenes of warfare were enacted at Annapolis, Beauséjour, and Louisbourg.

The first permanent settlement in North America (north of Florida) was at Port Royal (Annapolis), Nova Scotia. Port Royal is characterized by an early French historian as the most beautiful earthly habitation that God ever made. De Monts was given the title of Lieut.-General by the French king and commissioned by him "to people, cultivate and cause to be inhabited the lands of Cadie." As might be expected, this first settlement was the home of many first things: the first grist mill in Canada; the first water-power; the first charcoal, manufactured on what was the first forge. The first bark and shallop in Canada was built here by Pontgravé. This last was the humble beginning of what was to prove a great industry.

The first capture of Port Royal was by Samuel Argall in 1613, and Acadie was then claimed by the British. As there was in the new world a New France and a New England, it occurred to the Scottish mind that there should also be a New Scotland there. Accordingly Sir William Alexander in 1621 obtained from James I a charter and gave to this land its name of Nova Scotia. For the next century Port Royal was tossed like a foot-

ball from one to another in the contest for supremacy in America. Finally in 1713 it was ceded to the British, who changed the name of Port Royal to Annapolis in honour of the English Queen.

Nova Scotia is beautiful. The Atlantic rolls around it on rocky coast or surges into the land, leaving innumerable and entrancing bays, harbours, and coves in its wake. Fresh breezes blow continually over the land, for no part of it is over thirty miles from the sea. These salt-laden breezes bring life and invigoration. The bays and coves are strewn with picturesque little islands, of all shapes and sizes. On one of them the famous pirate, Capt. Kidd, is supposed to have buried his treasure, and thus unwittingly provided a game of hide and seek for the world ever since.

There are wonderful valleys running through the land. There is the Annapolis Valley, the Gaspereaux, the Cornwallis, the St. Croix, the Sackville, the Wentworth, the Margaree Valley, Dream Valley, and many others. The most famous of them all is the Annapolis Valley, with its thirty-five thousand acres of fruit-bearing trees. Nova Scotia is thus the foremost apple-growing province in Canada. The apple trees were brought by the French two hundred years ago, and a few of the actual trees brought by them are still flourishing. When it is apple-blossom time, it is possible to drive for a hundred miles with the pink and white loveliness of the blossoms and the perfume-laden air on every side. In the orchards overhead and all around are blossoms and neither beginning nor ending can be seen to this marvellous assembly. The whole world has been turned into a bower of fragrant beauty. A few short months, and the scene is changed. The trees are bowed to the ground with the weight of the ripening fruit. Two million barrels of apples is the rich harvest.

But many who do not know the Annapolis Valley for its apples know it as the land from which were exiled the unhappy Acadians. A Harvard professor, from his arm-chair, put the story of that tragic happening into verse which has haunted the heart of the world and given to

THE HON. E. N. RHODES, K.C., LL.D

Prime Minister of Nova Scotia

this part of the country the name of "Land of Evangeline." At Grand Pré are to be seen the old willows and the old well.

Nova Scotia's wealth of beauty and diversified scenery and historical and romantic lore is to be found within the compass of a scant few hundred miles. There is beautiful Chester, where so many Americans have made their summer homes that it is now an American colony in Canada. There is St. Margaret's Bay, so called by Champlain, with its sixteen miles of shore, its entrancing coves and harbours. There is Mahone Bay, with an island for every day in the year, which takes the name of Mahone from the fast-sailing crafts used by the pirates of old. There is Lunenburg, with its two harbours, the most interesting town on the south shore, for it is the home of the North Atlantic fishing fleet and the only town to carry on fishing successfully on a co-operative basis. There is Shelburne, of Loyalist fame, and Barrington, in whose old cemetery the grandmother of John Payne, the author of "Home Sweet Home", lies buried. There is Liverpool, on the Mersey, where a great pulp mill has recently been built whose wheels of industry convert the product of the forest into an article which bears to the world the news of the day. There is Chezzetcook, a quaint Acadian village in a setting of two hundred years ago. There is Musquodoboit Harbour, the grant of which is said to have been acquired by George Bayers from the Duke of Kent: the story being that George was a talented singer and the Duke of Kent asked George to sing a song for him, promising him a grant of land if he would do so. Thus George acquired Musquodoboit Harbour—and he got it for a song. There is Petpeswick Harbour, with its magnificent sand beach; Jeddore, named for the Indian, Ned Jeddore; Tangier; Spry Bay; Mushaboom; Sheet Harbour; and a host of other lovely places. The oldest place on this shore is Canso, early visited by the Breton fishermen, now the station for the cable that crosses the Atlantic.

But all of Nova Scotia is not by the sea. There is beautiful Pictou County, the cradle of many noted men;

Antigonish, which, although one of the smallest, is considered by some to be one of the most beautiful of the counties. Cumberland, Colchester, and Hants are historic old counties which redound with Micmac lore. The Indian god-man Glooscap had his home at Blomidon; and Kings, Cumberland, and Colchester were scenes of his miraculous exploits. Digby County has within its borders the Bear River, famed for its cherries. Digby, the shire town of the county, is the Mecca of the American tourist. Yarmouth is an open door of this happy land, and leads to the celebrated Annapolis Valley. The capital of the province, Halifax, is a historic old city, almost surrounded by water. Its harbour is one of the finest in the world. The city, which was founded by the Hon. Edward Cornwallis, was to be the headquarters of British power on the Atlantic coast. The most conspicuous of its many forts is the Citadel, in the centre of the city. Halifax is also a city of churches. The oldest Protestant church in the Dominion is situated beneath the shadow of the citadel. In its crypt are buried many illustrious dead. There is a royal pew, and there are numerous heraldic shields on the walls. The church is built of New England timbers brought from Boston in 1749. In the Province House there is the table around which the first Council of Halifax sat. There was no building then, and the Council met on board the transport that brought the settlers over.

At the extreme end of the province is the island of Cape Breton. Situated at the very end of the Continent, it would seem to be a last effort of Nature into which went all her skill and wisdom. There is wealth untold in the coal mines, which run far out under the ocean. There are great steel works at Sydney, where rivers of molten metal are turned into that indispensable factor of modern transportation, the steel rail. In Cape Breton is one of the most beautiful inlaid bodies of salt water in the world, the Bras d'Or Lakes. Baddeck saw many of the experiments carried on by Graham Bell, and it is here that he chose to be buried. At Glace Bay Marconi conducted experiments, the value of which defies

TYPICAL FISHING HAVEN IN NOVA SCOTIA

THE GASPEREAU VALLEY IN KINGS COUNTY, NOVA SCOTIA
An enchanting region of apple orchards and fertile farms

imagination. He established the first wireless in America here, and it was here that he received his first wireless message.

There is plenty of opportunity for recreation in Nova Scotia. The people do not live a frantically strenuous life, but pursue the even tenor of their ways. The province is a veritable paradise for devotees of the rod and gun. In one county alone there are over a thousand lakes, and the countless rivers, streams, lakes, and bays teem with fish. Salmon, trout, and the monster tuna and sword fish are here to be found. In season, the hunter's bark horn may be heard calling the lordly moose, or he may be content with the deer or the lowly partridge.

A country's worth is not according to the number of square miles it possesses, but according to the square people it contains. Nova Scotia is very happy in this regard. Its people are chiefly of English, Scotch, French and German origin, with a small number of that pathetic remnant of a race—the Indians. Acadian French live in Halifax County, along St. Mary's Bay, and in Yarmouth County and different parts of Cape Breton. Those of German origin are in Lunenburg County: the Scotch in Cape Breton, Pictou and Antigonish. The British compose about eighty per cent. of the population.

As precious goods are wrapped in small parcels, this province contains a great wealth of natural resources. It has vast coal mines, iron, gypsum, clay deposits, fisheries and forests, orchards and farms. It would take a book to write the history of each. A foremost source of wealth is the fisheries—the fish being to Nova Scotia what the wheat is to the prairies. Revenue from the fisheries for 1928 was over eleven and a half million dollars.

Deposits of coal with their immense potentialities of heat and power are estimated to be plentiful enough to last for hundreds of years. These treasures were in early times bestowed with ignorant generosity on a spendthrift English duke who deeded these mines of black diamonds to his chief creditor, a famous firm of English jewellers. Now the extent of the wealth of

the coal mines is fully realized, and some thirty millions of dollars is Nova Scotia's annual revenue from her mines.

Nova Scotia also has a source of wealth in agriculture, its gross revenue for 1928 being $40,000,000. There is abundance of fertile land for general farming and fruit raising. Nova Scotia has always devoted much attention to education, and has a larger proportion of educational institutions than any other province in Canada. The institutions include five universities, some ten colleges, and a large number of schools.

Until the inhabitants shall no longer say, "I am sick," Nova Scotia must continue to make provision for illness. This she does by the usual means of medical schools, hospitals, clinics and various preventive measures. In the matter of hospitals, the province is exceptionally well equipped, having an accommodation of 3,600 beds in its various general and private, pædiatric, maternity, contagious diseases, mental, naval and military, and tuberculosis hospitals, or six beds to every thousand inhabitants.

Nova Scotia has a provincial health officer, public health and school nurses. Halifax, its capital, is unique in that practically all its health, or ill-health institutions are grouped in the same area. The Victoria General, the Maternity, the Infectious, the Tuberculosis, the City Home, with its indigent poor, the Children's Hospital and the Medical School of Dalhousie and the Clinic, are all within a stone's throw of each other. The last is a magnificently equipped building, one of the finest on the continent. It is the Dalhousie University Public Health Clinic and bears this inscription: "The cost of this building was defrayed out of funds provided by the munificence of the Rockefeller Foundation. It was erected to facilitate the training of medical students in methods of caring for the Public Health and to assist in alleviating sickness and suffering in the city of Halifax. A.D. MCMXXIII."

The Medical Society of Nova Scotia is one of the best organized of all provincial associations that are affiliated with the Canadian Medical Association. The provincial

MEMORIAL CHURCH AND STATUE IN EVANGELINE PARK AT GRAND PRÉ, NOVA SCOTIA

Society is made up of nine affiliated branch societies, membership in one of which is necessary to membership in the provincial society. It is noted that membership in the provincial organization is essential for membership in the Canadian Association. If one is a member therefore of the latter, he is a member also of three associations—the local, the provincial and the national.

Besides dealing with medical phases of all kinds, the Association directs great efforts to keeping its members fully abreast of the times, feeling that in no profession is it more necessary to have the very latest and best that the world affords than in this profession that deals with human lives. As it is impossible for the average practitioner to leave his work to take a post-graduate course in Vienna, London, Philadelphia or some other centre, the Medical Association brings the post-graduate work to the doctor in the form of lectures given by clinical teachers of Canadian universities. This is made possible by the Sun Life Assurance Company, who have given a grant of $30,000 a year to the Canadian Medical Association. No longer will there be justification for such an epitaph as that on the stone in St. Paul's cemetery, in which a Scottish father bewails the loss of his children, names the spell which overthrew them and, in sad distrust of the healing art, demands, "Stranger, which has disease or medical omission clad maist in their last claith?"

NEW BRUNSWICK

By the Hon. John B. M. Baxter, K.C., LL.D.
Prime Minister of New Brunswick

NEW Brunswick is enjoying one of the most prosperous periods its people have ever known, with agricultural and industrial activity especially marked, and a substantial upbuilding taking place in virtually every field of development. Almost every crop of major importance showed an exceptionally good yield last year, and the financial return from agricultural production in the province was considerably larger than the average, reaching figures that rivalled the record years for agricultural prosperity.

Marked expansion of the forest products industries of the province has attracted much attention to New Brunswick during the last two years, and brought about the most prosperous conditions in many sections of the province that have been enjoyed for many years. Pulp and paper plants have been constructed, and existing plants expanded following completion of the largest hydro-electric plant in the Maritime provinces at Grand Falls on the Saint John River.

The great natural water-power of Grand Falls is located approximately 225 miles from the mouth of the Saint John River, and by harnessing the water-flow there a development has been completed which, without extension of the present storage facilities, is capable of providing 60,000 horse-power of continuous energy. One of the outstanding features of this development at Grand Falls is the pressure tunnel, which is the largest in Canada; excavated through solid rock under the town of Grand Falls it connects the intake a short distance above the main dam, which has been constructed across the river just above the peak of the cataract, with the power house, which is located at the lower basin. The tunnel is

THE HON. J. B. M. BAXTER, K.C., LL.D.
Prime Minister of New Brunswick

2,755 feet in length and 24½ feet in diameter, and is lined throughout with concrete.

The Grand Falls development is the key factor in the $40,000,000 programme in progress for pulp and paper and power industrial expansion in New Brunswick, involving the building of new pulp and paper plants on the Restigouche, the Upper Saint John, and the Miramichi Rivers. Power from Grand Falls operates the plants on the Upper Saint John River and has been carried by a transmission line 125 miles across the north of the province to plants at the mouth of the Restigouche River on Bay Chaleur. Without the Grand Falls power development the construction and operation of these pulp and paper mills would not have been feasible; and at the same time the development at Grand Falls seemed impossible unless industrial enterprises were undertaken which would provide a market for a large proportion of the power to be developed.

The International Paper Company carried out the hydro development at Grand Falls through a subsidiary, the Saint John River Power Company. This subsidiary is now operating the plant at Grand Falls. Through another subsidiary, the New Brunswick International Paper Company, a newsprint mill at Dalhousie at the mouth of the Restigouche River on Bay Chaleur has been completed with an initial installation for a daily capacity of 250 tons of newsprint paper, which will by the end of this year have a daily capacity of 500 tons. There will be a complete groundwood and sulphite pulp making department at the plant at Dalhousie, so that wood will be carried through all the various manufacturing processes leaving as newsprint paper.

The International Paper Company have stated their intention to build also a pulp mill on the Miramichi, for which a site near Chatham has already been secured. This plant will probably have a daily capacity of about 100 tons of bleached sulphite pulp. Establishment of a pulp mill at St. Leonard on the Upper Saint John River is also included as part of the International Paper Company's industrial programme for this province. The

Bathurst Power and Paper Company, which some time ago took over the first newsprint mill operated in the Maritime provinces, at Bathurst, have doubled the capacity of this mill, and the capacity of the Company's power plant on the Nepisiguit River has also been increased. The Fraser Companies, who used the first power generated at Grand Falls for their pulp and paper plants at Edmundston, have recently added to and expanded their plants there and they recently have completed a sulphite pulp mill at Athol, near Campbellton; their extension plans in New Brunswick also include a proposed new pulp mill on the Miramichi.

This entire programme of expansion of the forest products industries of New Brunswick is built around utilization of the water-power resources of the province for the manufacture of products of New Brunswick's forests, and by this means the providing of profitable employment within the province in industrial enterprises which are being built for permanence and should, therefore, contribute materially to the continuing prosperity of New Brunswick.

Expansion and progress have been taking place in many of New Brunswick's most important manufacturing industries, including some of the establishments which market their products throughout the whole Dominion and beyond. The increasing activity at the port of Saint John, which has been nationalized, has been marked by further use of the immense drydock and the associated works. Another forward step has been the establishment of municipal airports at Moncton and Saint John, so that New Brunswick can take its part in the development of commercial aviation.

The recreational resources of the province have attracted so much attention that tourist traffic has become one of our leading wealth-producing industries, justifying the establishment of a Provincial Tourist Bureau. Many thousands of visitors come to New Brunswick annually, there having been an increase of more than 80 per cent. in their numbers these past three years, and all the people of the provinces benefit indirectly, if not

PARLIAMENT BUILDINGS, FREDERICTON, NEW BRUNSWICK

SALMON FISHING IN NEW BRUNSWICK

Courtesy of the New Brunswick Government Bureau of Information

LOG DRIVING ON THE RESTIGOUCHE RIVER, N.B.

Huge piles of pulpwood logs being rolled into the Restigouche River by New Brunswick lumber-jacks. These logs are on their way to the new Dalhousie news-print paper mill of the New Brunswick International Paper Company.

SALMON ANGLING ON THE RESTIGOUCHE RIVER, N.B.

Courtesy of the New Brunswick Government Bureau of Information

directly, from the millions of dollars expended by New Brunswick's visitors. In order to make this province's attractions the more readily enjoyed by visiting as well as resident motorists the province is expending annually approximately five million dollars for the improvement and maintenance of highways, and it is intended to expend ten million dollars annually to hard surface the motor roads. Thus New Brunswick is developing a roads system that is playing its part in the upbuilding of the province with the increasing utilization of motor vehicles as means of transportation.

The financial position of the province has been markedly improved by the successful culmination of negotiations which had been in progress for some time to have the Saint John Valley Railway taken over from the province by the federal government as a part of the Canadian National Railways system. This relieved the province's ordinary revenues of an annual charge of approximately one quarter of a million of dollars and made possible further needed assistance to several important public services which will prosper with the stimulation thus provided. The elimination of the province's liabilities to the extent of six million dollars in respect to this railway was a gratifying feature of the transfer.

New Brunswick is the largest of the Maritime provinces in area, and the population of the province is estimated at 419,000, according to the latest figures. This does not show any spectacular increase. On the other hand, however, there has been a steady influx of carefully selected immigrants and colonists, largely from Great Britain and Scandinavia. The promised new era of activity and prosperity for this and the other Maritime provinces seems definitely to have dawned, and, with a new spirit apparent on the part of its own people and evidence of practical interest from the rest of the Dominion, there is every reason for New Brunswick to look forward to the future with hopeful expectation.

QUEBEC

By the Hon. L. A. Taschereau, K.C., LL.D.
Prime Minister of Quebec

OF the nine provinces forming the Canadian Confederation, there is none in which the national spirit has more readily and more continuously progressed than in the old province of Quebec. An enlightened and generous patriotism, founded on the knowledge of realities and the acceptance of facts, animates the province.

The primordial reason for these sentiments so deeply set lies in this province being the very heart of Canada.

Here was observed the first general social, economic, and historical movement in the land.. The colony was barely afoot, and yet from its midst started on their journey the discoverers, the explorers, the missionaries, the colonists, so many of whom often shed their blood as proof of their faith in a higher civilization in which takes pride to-day the North American continent. Granting to each of our sister provinces what is its own and what is its especial contribution towards the national welfare of Canada, we may say: Here was felt the first beating of the Canadian heart, as here beat the hearts of two great races, in the happiest harmony which alone makes for a lasting prosperity. And these races, through us, are here welded into one nation whose frontiers, outrunning the primitive provinces, extend to the gates of three Oceans.

Social life began here with the foundation of Quebec by Champlain, in 1608. It rapidly gathered strength. At first appeared the life of the cities and, nearly forthwith, the life of the villages. Around Quebec, Three Rivers, Ville-Marie (later Montreal), small rural centres were established which throve under the protection of our forts.

THE HON. L.-A. TASCHEREAU, K.C., LL.D.

Prime Minister of Quebec

From a social point of view, French colonization in Canada marks one of the peaks of European civilization, and the motives which prompted France's colonial efforts are amongst the noblest to be found in the soul of nations. Our fathers brought with them what the French civilization of the seventeenth century meant to be stronger and more permanent. So the characteristics of our race have remained fundamentally unchanged after three centuries, although we have taken care to comply with new conditions. In this adaptation the province of Quebec has fully succeeded.

Thus our ancestors brought with them those intellectual and moral qualities known as intuition, foresight, discernment, ingenuity, faith, patience, loyalty, forbearance, tenaciousness, charity, the whole made one in a natural sense of community, uprightness, honour, respect of neighbours and discipline, and completed by that joyous disposition in their labours which always caused them to be admired by strangers.

Everything remains to be done when they reach our shores. They do all things with boundless enthusiasm. The hostile Indians, the climate, so severe before the necessary clearing of forests could be effected, the remoteness from the Mother Country, the difficult communications, nothing can prevent them from feeling that an immense future is held in store for the land to which they devote themselves with religious fervour.

Their domestic organization is perfect. With them the principle of authority is never challenged. Mutual love binds their hearts together. Their political organization is very simple. The king is represented by a governor, who is himself assisted by a council. An *intendant* executes the minister's orders. As to law, the Custom of Paris prevails. The judiciary system is as practical as it is unadorned. Although, at times, may have arisen causes of friction, one must admit the flexibility of such a machinery so well suited to the requirements of a new colony. Even the seigniorial régime is at home with our people, as its form is really paternal. Indeed, from the governor empowered by the king down

to the humblest rent-payer, it is fair to say that New France is like an immense family. So, one day, having studied the constitution of the French colony in Canada, some economist will, no doubt, write that it has been one of the finest examples the world has given of a young nation finding in family life its best prototype. In New France there is something so naturally methodized, so unsophisticated, and yet so hardy, that a Fustel de Coulanges, had he examined those points of our national life, would have thought that the *Cité Antique* could have taken from Canada a last lesson.

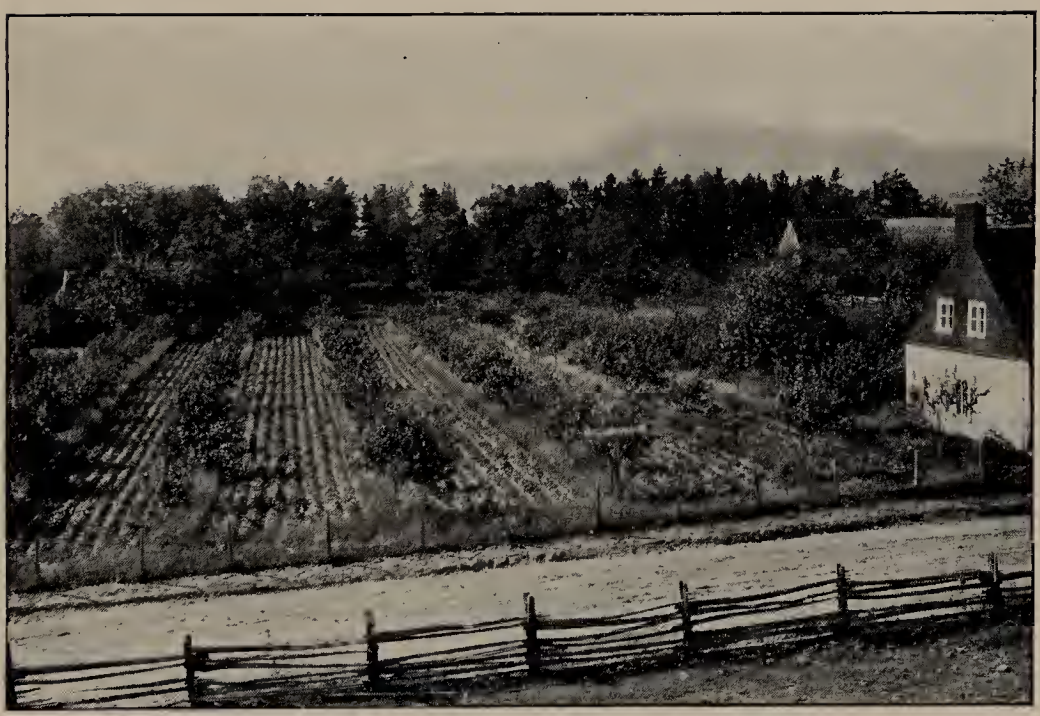
The seignior attracts the colonists to his lands and often supports them on his own moneys. Near the manor are built the flour-mill and the other constructions required for the local industry. There is nothing haughty about the seignior. He is master in his domain, even the military chief when an enemy attacks; never is he a tyrant. If fortune ever smiles upon him, it is not that he has amassed riches at the expense of his colonists, but through his own work, the wise administration of his domain, or because of the revenues derived from what he has brought from France, or what is still his own there.

Not far from the manor stands the chapel or the church. Between his manor and the steeple of God's abode, between his seignior and his priest, the villager goes on living happily. He clears the bush, tills the soil; his land costs him a slight quit-rent. His moments of leisure are spent in church solemnities, family or village festivities. Nowhere on earth is there a more deeply religious people, with a more open conscience and a more joyful heart. As to the *habitants*' politeness, it is not far from being exquisite, as their urbanity is charming, both quite worthy of the example set by the seigniors.

In the cities, the mode of living is also simple. But here the social graces of France bloom more extensively. Our people are extremely polished, so say foreigners themselves, for instance Peter Kalm, the Swedish academician and traveller.

Had it not been for the unceasing state of war which, from city and field, claimed so many men, prosperity

THE CHATEAU OF SPENCERWOOD, QUEBEC
The Lieutenant-Governor's residence



A TYPICAL ORCHARD, ON THE QUEBEC WAYSIDE,
NEAR THE ST. LAWRENCE RIVER
Note the Laurentian Mountains in the background

PARLIAMENT BUILDINGS, QUEBEC (partial view)
In the foreground, Mercier's statue

THE QUEBEC BRIDGE: AN ENGINEERING MARVEL

This bridge spans the St. Lawrence, a few miles above Quebec city. Total length, 3,239 feet. Width, centre to centre of trusses, 88 feet. Level above high waters, 150 feet. Length of the central suspended span, 640 feet. A vehicular roadway has been constructed in 1930 between the railway tracks.

would have been quite general in New France. But one has only to read the story of the last years of the French régime in Canada to understand fully how the state of war and the occupation of our rural territory by the British paralysed our national existence.

Economic and historical life have also begun here. Manufactories, even iron-works, and village or domestic handicrafts add to agriculture new sources of income for the colonists. Colbert and Talon wish that the French settlement may, when need be, provide for itself. Moreover, there is the exchange of imports and exports. The fur trade is most active. Still many other things are shipped to France. Vessels are laden with masts for the King's navy; but, of course the Sovereign has a right to these, whether they grow on the seignior's or on the quit-payer's land! Ships return from France with cargoes of wines, fabrics tools, etc.

In 1763, by the treaty of Paris, Canada is ceded to the British. The population of New France amounts to 60,000 souls. Not only do the clergy share the fate of the colonists, but also a considerable portion of the French noblesse, those who have, through the possession of seigniories, made of Canada their country. Schools were then quite numerous, well organized and well attended. There were even colleges where classical education was diligently given; here, the local clergy, our noblesse, our principal merchants and explorers were educated.

It must be said that the percentage of illiteracy was as low in Canada as in any European country, if not lower.

If our former Mother Country could have saved her colony, it would have been the fairest jewel to grace the crown of the Bourbons.

Separated from France, our forefathers lived in difficult circumstances. To others the very source of life would have seemed vanished. Not so with our people. There is no more French immigration, and trade is permitted with the British only. But an indomitable spirit helps everyone to weather the storm. The French-Canadian

cradle is never empty, the vitality of our race is nothing less than phenomenal. Economically and politically also we are getting every day stronger. As our constitutional plea is better listened to, and a greater liberty is granted us, we become richer and more influential. What we acquire thus we use to the better advantage of our dear province and of Canada at large.

Thus was history written in glorious chapters. No land in the world can boast of the like. The French régime opens the book of Canadian history, and these pages read as a marvellous romance. See the gorgeous pageant composed of Jacques Cartier, Champlain, Frontenac, Montcalm, Lévis; Jolliet, Marquette, La Salle, La Vérendrye; Laval, Brébeuf, Jogues, Lalemant, and so many others! See, on the Plains of Abraham, at Quebec, how is sealed in the blood of the French and English, in 1759, the covenant of the future grandeur of Canada, a greatness which is proof of what is nobler in two invincible races, as this invincibility was to be proven the next year, at the battle of Sainte-Foy.

And, under the British rule, behold these struggles in defence of liberty, of a liberty that is part and parcel of Canada to-day and stands out as a vivid example for the British Dominions across the seas to follow. The Act of 1774, that of 1791, that of 1841, all led to the Confederation of 1867, which would have been made impossible without the assent of Lower Canada.

Our fealty to the British Crown is the object of our Bishops' charges and teachings.

To our help and co-operation do the British owe Montgomery's failure before Québec, in 1775; and Hampton's at Châteauguay, in 1813. At Châteauguay, Irumberry de Salaberry and his three hundred comrades renewed the valorous deeds of Leonidas and his men. Canada also had its Thermopylæ.

In fact, we are British. It is precisely our British citizenship that our leaders proclaim. And British citizenship carries British fair-play in its wake. Our bishops, Briand, Plessis; those at the helm of government, Cartier, Taché, Lafontaine, Laurier, all take the same

stand; and, with them all, our kinsmen in the rank and file, in a fervent love of our native Canada. In this province, Mercier, Chapleau, Gouin and their like never had another ideal. The constant endeavour of each and every one is, so to say, to see this ideal fit into the national realities.

Indeed, the first pulse of Canadian life was felt here. We have been true to our French origin and have treasured our delightful language; but nothing under the sun can keep us from having been, in history and in fact, the first Canadians. Such is our birthright. Three hundred and twenty-two years of staunch Canadianism have identified us with our soil, our institutions, our liberty, and our citizenship, in such a manner that we are forever embodied in Canada. Tearing us away from our country would simply mean tearing away our very life. What is more, our racial characteristics, whether they be natural or acquired, are the safest rampart Canada may ever erect against foreign assimilation or annexation to a neighbouring republic.

Now, embodied in our country, with our country we have also prospered. To the new fellow-citizens the treaty of Paris gave us we have frankly extended our hands. We have thought they added to the principle and fact of Canadianism qualities worthy of our own; but never have we thought of giving up what is ours. So we profess that mutual respect and consideration are the essentials of Canadianism. We loyally live up to this conception of patriotism, as we know that our English-speaking brothers and ourselves constitute two of the highest forms of civilization, for the better weal of our common land, Canada.

From the great artery that crosses Canada through and through, the Saint Lawrence River, the province of Quebec had the privilege of sending flowing upstream, towards the Lakes, under both rules, the French and the British, this Canadian civilization we are all so proud of. But our people were not satisfied with that. The La Vérendryes went further west and reached the Rockies, the Canadian Alps. Under the British rule, Mackenzie,

as those who under the French régime had discovered the Mississippi, reached the Mackenzie River and the Pacific Ocean, with his French-Canadian comrades.

Here then, either in successive or in common action, two great races assist one another in establishing glorious traditions and writing down Canadian history. Such results cannot be destroyed. Far from retarding progress in this province, mutual accord, free and willing co-operation have powerfully contributed in giving this province the exalted position it occupies in Canadian life.

We have reviewed the past. Let us glance at the present.

The total area of the province of Quebec, since Ungava or New Quebec was annexed in 1912, is 703,653 square miles, or 1,822,460 square kilometres. It is the largest in this Dominion. It could contain England, France and Belgium; or France, Spain and Germany. Its area is nearly one-fifth of that of Canada. Its population approaches the three million mark, and the greater part of this population (more than 80%) is of French origin and use French as their mother tongue. Still, never has bilingualism been so frequent as in the province of Quebec. To speak both languages is considered here the usual and necessary thing for everyone, either in social intercourse or in business.

The liberty of worship and that of teaching meet with no bickering nor vexation here.

The birthrate is 32 per 1000.

Our younger generation is educated in 7,210 elementary schools, without mentioning academies, high-schools or intermediate institutions. The total number of all schools is 8,125. Twenty-three classical colleges are affiliated to our universities and the total number of students attending our four universities, in 1928, was 17,552. Furthermore, seven technical schools and two schools of Beaux-Arts are open to students. The total teaching staff in this province numbers 23,399, and 605,491 pupils are under the guidance of our professors and teachers. The average attendance in all schools (and it must be remembered that education is not com-

QUEBEC, VIEWED FROM THE PARLIAMENT BUILDINGS TOWER
A partial glance at the harbour; in the distance the Island of Orleans

CANADIAN INTERNATIONAL PAPER MILLS AT THREE RIVERS, QUEBEC

Courtesy of the Royal Canadian Air Force

pulsory) is 80.39 per cent. The total contribution of tax-payers for the maintenance of schools amounted to $25,823,855.00, to which sum must be added the government grants of $3,983,753.00, forming a grand total of $29,807,608.00.

The expenditure of the benevolent institutions in this province (1927) totalled $12,442,237.00, and 90,586 patients were admitted to the hospitals, maternities, homes, orphan asylums, sanatoria, etc. We may say that as regards public and private charities, this province is second to none. The government grants amounted to $2,074,118.17.

In 1928, the estimated value of crops, here, was $130,363,000.00.

As to forest industry, the approximate area of our timber land (those of Labrador and New Quebec excluded) is 120,170,809 acres or 187,766 square miles. In 1827, 2,255,259,064 feet (board measure) of timber were cut on these limits.

The total value of production derived from mines and quarries in our province, for 1928, reached $37,325,287.00, being the greatest registered to date. Asbestos alone netted $11,238,361.00, as here is produced about 85 per cent. of the asbestos output of the world.

Our fisheries also number amongst the most extensive in the world. In 1927, the value of production reached $2,736,450.00, and 400,573 cwt. was the quantity of fish caught and sold in this province, in 1927 also.

The available and developed water power in the province, in January, 1929, ordinary six months flow, was 13,054,000 H.P. The available proportion of motive power developed per 1000 population was 902 H.P. The total capital invested in electrical industry, here, is $308,580,159.00; the present capacity of the turbines in operation in the province equals about 45 per cent. of the total capacity of the Dominion.

In 1927-28, the value of pelts of animals captured here was $3,500,194.00. The value of animals on fur farms was $13,465,882.00.

As to industries, the capital invested therein (1927)

reached the sum of $1,376,654,019.00, and the gross value of products was $990,582,995.00.

The value of production principally derived from manufactures and agriculture (1926-27, gross value) amounted to $1,515,224,487.00.

For a population of 2,561,880, in 1926, the total estimated wealth in this province was $6,656,108,000.00, or $2,598.00 per head, being a ratio of 24.9 per cent. for all Canada.

The improved road mileage here, on December 1, 1929, was 12,502, not including the length of city and town roads. Over one thousand highway bridges were built from 1908 to 1929, at the cost of $11,767,716.46.

On December 1, 1928, the railway mileage in this province was 4,920.70, and the tramway mileage 446.38, making a total of 5,367.08 miles. For the same year the gross receipts of tramway companies were $17,614,574.73.

The total automobile registration (1929) was 169,105, or an increase of 14.1 per cent. on the previous year's registration.

The wire mileage of the telephonic system (1927) was 769,343. The number of telephones totalled 255,970. The net revenue of the principal telephone companies was near the $5,000,000.00 mark, for the same year.

In 1928, the total mileage of telegraph wires was 39,067.

In 1928 also, the total tonnage of traffic, on the St. Lawrence canals only, was 8,330,894.

In 1929, our exports and imports were $738,136,092.00.

There were 1,135 banks doing business in this province, in 1928; and here are a few figures dealing with the operations of our clearing houses, for the same year: Montreal, $8,072,843,473.00; Quebec, $361,754,089.00; Sherbrooke, $50,673,179.00.

Labour is strongly organized here. There were 454 labour organizations in 1928, and 160,267 was the number of employees in the forty principal industries, or 196,094 for all industries. Very good results are derived from the operations of a model Workmen's Compensation Law. A Women's Minimum Wages Commission, a Commission for the study of Social Insurance, etc., etc., show that the

workmen's welfare is the object of very special attention. Social peace exists here as it cannot be found elsewhere.

For the year 1928, $14,042,901.00 fire insurance premiums were received by insurance companies; the receipts of life insurance were $945,915,028.00.

To make a long story short, here are a few financial data on this province, for the last fiscal year:

The ordinary expenditure amounted to $39,976,283.04; the ordinary payments, whether ordinary or extraordinary, totalled $35,964,487.42, leaving a surplus of $4,011,795.62, deduction being made of the sum of $1,000,000.00, included in the ordinary payments in the fiscal year, set aside for the redemption of the public debt.

The financial situation of this province is as sound as can be. Every year, since 1898-99, the government books show a surplus, that of 1921-22 amounting to $5,033,-419.45. That is an achievement without par in the land. Facts and figures usually seem rather dry and drab. But thirty-two years' uninterrupted prosperity certainly mean more than a good story well told.

Shall we now add that Montreal is one of the largest ports in the world, and that the population of that city is over 1,000,000 souls? Shall we also say that this province is the sanctuary of picturesqueness and beauty, as well as the realm of history and prosperity? Shall we add that the city of Quebec offers to the eye wonderful vistas, unique in the world, and that Gaspesia, from every point of vantage, abounds in ravishing visions? How many things more one could write about this province of ours! The first Radium Institute was established in Montreal, and one and one-fourth grammes of the precious substance was bought by the government, and left in the care of the Montreal University. A bold solution was here found for the world-wide problem of temperance, when the Quebec Liquor Commission was established, which has shown the way for others to follow. But we rather let visitors to our province see for themselves all we claim it is, a moral, prosperous, happy and healthy population living in the land of plenty, and Canadian to the core.

The members of the British Medical Association and their friends, and in fact all those who feel in sympathy with us, may come and visit the province of Quebec. From all alike, from all classes of our population, they will receive marks of attention and friendship. Nobody ever comes to this province without gaining thereby a better understanding of facts, a clearer interpretation of history, a nobler conception of Canadian citizenship and of mutual tolerance. And we trust our visitors will always keep a pleasant remembrance of their sojourn here as we shall surely treasure the privilege of their company.

We have endeavoured to show what is the province of Quebec and the different phases of its evolution up to the present. Its motto is: *Je me souviens!* Here no tradition is denied, nor is any right forsaken or surrendered; but, also, the traditions and rights of others are acknowledged, and we admire our English-speaking fellow-countrymen in their wish to perpetuate and their success in perpetuating them.

Our progress is marked by social and political peace. Here is given to the world and to Canada at large a constant example of what fruit justice, strength of discipline, respect for one's neighbour, enlightened patriotism, can bear. We ask nothing else for the French-Canadians living in our sister provinces, where they are a minority, than what we so gladly grant our English-speaking brothers in this province. We believe in the old saying: An house divided against itself shall fall. So we confidently entrust our English fellow-Canadians from the other provinces with the destiny of our sons outside of this province. We pray that the like be done unto our own as we do unto others.

The province of Quebec has but one ambition: that of serving, with all its energy and devotedness,—in preserving the racial characteristics of both French and English Canadians,—the great cause of our common and beloved country.

Thus shall our province never cease being the very heart of Canada.

ONTARIO

By the Hon. G. Howard Ferguson, K.C., LL.D.

Prime Minister of Ontario

FEW words of introduction are needed to the matter-of-fact sketch of economic and social conditions in the province of Ontario here presented. The visitor from another part of the Empire will find in this province a homogeneous community of British origin. In the pre-Confederation period, the province became the home of one of the largest Loyalist immigrations from the American Republic. The United Empire Loyalists who crossed the Niagara River, Lake Ontario, and the St. Lawrence brought in little else than their firm determination to live under the British flag. They did bring, however, a sound knowledge of farming; and they found land richer in all resources of successful colonization than the New England they left behind them. Soil and climate on the north shore of Lake Ontario offered them the permanent conditions of occupancy they most desired; and soon their orchards began to bloom all along the shores of lake and river, smiling welcome to the more numerous immigrants who were to come direct from Great Britain and Ireland.

The laws enacted by the first legislature, opened at Niagara in 1792, display continuous British purpose. Colonel Simcoe, the first lieutenant-governor of the province, actively engaged upon preliminary surveys of what is now the southern part of the province. He transferred English place-names as liberally as had been done in New England and New York. British connection was the guiding principle of the administration of the province. Since Confederation, the efforts of government have had to do primarily with the progress and development of the social and educational welfare of the citizens. Material well-being experienced a reason-

able rate of progress while agriculture and lumbering were the stable industries. Economic geology soon found new sources of wealth in metals; copper and silver deposits being the first worked in the Lake Superior region. Mineral production did not, however, begin to assume the important proportions of recent years before construction of the government railway northward through the Precambrian rocks had uncovered immensely rich deposits. Search for precious metals in the Precambrian shield through the entire breadth of the province has now "proved up" the largest mineral-bearing territory known in the world. There has been going forward at the same time through northern Ontario an equally important development of the forests to supply the rapidly expanding requirements of the paper industry on this continent. The economic life of the entire province has in short broadened out. The efforts of government throughout these years of recent development, as formerly, have been consistently directed to the ultimate object of building up Canada as the foremost of the British dominions. Large-scale production in varied lines of manufacture has given proof of the tremendous value of Ontario's natural resources. This natural wealth is being developed with increasing appreciation of the vital part that the Dominion is destined to fill in imperial expansion.

The transportation facilities of Ontario afford a wide outlook on world markets for all products of farm, mine, and factory. The government of Ontario, therefore, in the spirit of Confederation, recognizes the essential fact that the forests, mines, and vast water-powers of the province are to be utilized for the advancement of the province as part of the Dominion. Ontario, as the central province of Confederation, British in its traditions, population, and outlook, takes a forward place in the movement for the development of the capacities of Canada to the utmost. In her schools, universities, laboratories, and industries the purpose has taken firm hold of making Canada and the dominions of the British Empire better places than other lands for British people to live in.

THE HON. G. HOWARD FERGUSON, K.C., LL.D.

Prime Minister of Ontario

General Features

The territory of Ontario extends from the great international waterways to Hudson Bay and between the boundaries of Quebec and Manitoba. The province is as large as France and Germany together, and equal in extent to eight of the near-by states of the American Republic. Farming represents a wide variety of production from the grape, peach, and tobacco-growing districts of the Niagara and Essex-Kent peninsulas to the clay belt of Northern Ontario, where the land is suitable for grain-growing. Mixed softwoods and hardwoods originally covered the St. Lawrence drainage basin which may be described as the southern part of the province. Great coniferous areas spread northward over the Hudson Bay drainage basin that produced the spruce forests now furnishing much of the world's newsprint paper. A wide belt across the province indicates the Precambrian shield.

The census of 1921 showed the population of Ontario to be 2,933,662. The officially estimated population as of 1928 is 3,229,000, or more than one-third of the number of people estimated for the whole Dominion. The province is, therefore, the chief centre of Canada's population. The 1921 census classed 2,291,979 of the residents of the province as Canadian born, and 459,577 as born in other parts of the Empire, leaving 182,109 of foreign birth, of whom 85,000 are naturalized. The percentage of United States born residents who had become naturalized was about equivalent to that of all other naturalized foreign-born. About 40 per cent. of the total British-born population of Canada is resident in Ontario. The province has contributed to western Canadian settlement 330,197, whose descendants form an influential class of citizens resident in the prairie provinces. A little more than 50 per cent. of the population of Saskatchewan is of Ontario birth or origin. Of the present population slightly less than 42 per cent. is rural and over 58 per cent. urban. The proportion of urban population tends to increase with recent important developments of industry in all sections of the province.

In 1891 over 60 per cent. of the population of Ontario was rural. At the same time the industrial development has been of assistance to agriculture, and in the past decade there has taken place an actual increase in the rural population. Nearly one-quarter of the gainfully employed residents of Ontario are engaged in connection with manufacturing industry.

Ontario furnishes by far the largest contribution to the agricultural wealth and annual agricultural production of Canada. In 1927 the gross agricultural production of Ontario was estimated at $506,000,000, as against $1,276,556,000 for the other eight provinces combined. The gross agricultural wealth of the province was placed at $2,261,678,000, as against $5,748,503,000 for all other provinces. Production includes among its chief items dairy products and specialized crops, such as grapes, peaches, apples, tobacco, corn, sugar, beets, and clover seed.

Manufacturing industries of Ontario have found expanding export and domestic markets during the past two decades, and especially since the application on large scale of electrical power to factory operation, from the Niagara and other hydro-electric systems publicly owned and administered by commission under government. In 1927, according to the official census of industry, there were located in Ontario 9,512 manufacturing establishments, representing invested capital to the amount of $2,134,181,377. These establishments paid out annually in wages and salaries $355,174,773 and used material to the value of nearly a billion dollars. The gross value of annual production was estimated as $1,758,004,575. Among Ontario-manufactured products that are gaining in foreign markets may be mentioned pneumatic tires, leather, machinery, motor-cars, copper, and its products, nickel and its products, fertilizers, and newsprint paper.

Education

The University of Toronto is the provincial university of Ontario, affiliated with Oxford, Cambridge, and Trinity College, Dublin. It has faculties of arts (including

sciences and commerce), medicine, applied science and engineering, household science, education, forestry, music graduate studies, and dentistry. The university has been intimately associated with the educational life of Ontario from the earliest days. The following are federated colleges: University College, Victoria College, Trinity College, St. Michael's College, Knox College, Wycliffe College and Emmanuel College. Other affiliated colleges or institutions are the Ontario College of Pharmacy, the Conservatory of Music, the Ontario Agricultural College, the Ontario Veterinary College, the Ontario College of Art, and the Royal Ontario Museum. Other university foundations in Ontario are Victoria University, the University of Trinity College, Western Ontario University (London), Queen's University (Kingston), University of Ottawa, McMaster University (Hamilton).

The educational system of the province is administered by the Department of Education. The system places on obstacle in the way of local control; and the Department of Education exercises powers assigned by the legislature which leave the management of school affairs in the hands of the municipal rate-payers and their boards. In 1919 an Act of the Legislature provided for compulsory school attendance of children between eight and fourteen; adolescents from fourteen to sixteen have the alternative of full attendance up to sixteen or full time attendance to fourteen, plus part time attendance to eighteen. This legislation increased attendance in the secondary schools.

The Ontario Agricultural College and Experimental Farm, Guelph, was established in 1874 to train young farmers in the science and practice of agriculture. Kemptville Agricultural School and Farm is smaller in scale than Guelph, and is intended to provide similar facilities for eastern Ontario. A similar school has been established at Ridgetown. A Horticultural and Experimental Station at Vineland in the Niagara fruit area is the most important station of its kind in Canada, and is concerned with the special problems of the fruit and vegetable growers.

Agriculture was the first technical branch of education undertaken in a special college. Training in handicraft

was introduced to Ontario schools in 1883. Technical education on broad lines has made rapid strides since 1910, and especially since the world war. In 1915 manual training branched out into industrial technical and art schools. Modern in construction and equipment are the technical schools established in Toronto and other educational centres. The number of pupils taking day and evening classes in municipal centres in 1927 was 63,622.

The Department of Education gives special encouragement to the rural elementary schools, and has provided correspondence courses for children in homes remote from any school, as well as school cars for children whose parents live along the remote lines of railway running through the northern part of the province. The Canadian National and Canadian Pacific Railways afford every possible co-operation.

The importance of scientific and industrial research has been recognized by the establishment of the Ontario Research Foundation, to which the government of the province has undertaken to contribute $2,500,000 in a five-year period, against an equal amount privately subscribed. The scientific equipment of the University of Toronto has been greatly increased and public interest has been aroused by such achievements as the discovery of insulin by Dr. F. G. Banting, Dr. J. B. Collip, and Mr. C. H. Best working under supervision of Professor J. J. R. MacLeod in the University. Investigations are being carried out in various departments of science in co-operation with the National Research Council. Organization of the Ontario Metal Industries Research Association has been completed. Concerns engaged in the metal industries of the province are all co-operating, and complete laboratory facilities are now to be put at their disposal at a nominal cost.

Water-Power Development

Ontario distributes approximately 1,900,000 horsepower, of which 1,443,780 is either developed or controlled by the Hydro-Electric Power Commission. The move-

ment in favour of public ownership of hydro-electric power has attained notable strength in Ontario in a period of twenty years. This movement led to the establishment of the Commission which now operates power generating and distributing systems in different parts of the province, chief of which is the Niagara system, altogether representing a provincial investment of $164,522,000. The expansion of the Commission's services has been remarkable. Ontario has cheap and widely distributed power, comparing favourably with any other country in the world. Including municipal distributing systems and other assets, over $315,000,000 has been invested in the public ownership hydro-electric undertakings. The function of the Hydro-Electric Power Commission is to provide for the people of Ontario at cost an adequate supply of electric energy. The financial success of the undertaking both from the government and municipal sides of the business has been demonstrated by the provision of reserve for sinking fund, etc., of over $86,000,000, covering the provincial and municipal requirements. This has been possible at small cost to users. The average cost of electricity to the United States user for domestic service is about 7½ cents per killowatt hour, whilst the corresponding cost in Ontario is less than 2 cents. More than 80 per cent. of the electrical energy utilized for domestic service in Ontario is sold in municipalities where the average charge to the consumer is less than 2 cents per killowatt hour. More than 80 per cent. of the energy used for commercial light is sold in municipalities where the average charge is less than 3 cents, inclusive of all cost charges. The number of municipalities served is 500, and the number of consumers 525,000. More than 8,000 miles of transmission lines of these public ownership services bring in a gross revenue of nearly $25,000,000. The government in recent years has made special efforts to place electrical power at the service of the rural population. Fifty per cent. of the cost both of primary and secondary lines for rural transmission is borne by the government, and with this

assistance the average rural service charge per month has been cut from $6.20 to $2.50.

Mineral Production

Minerals produced in the province of Ontario include both metallic and non-metallic substances. The mineral output of the province is increasing annually, and in 1929 advanced nearly seventeen million dollars to a total of $116,558,911. Of this total, metals accounted for $83,330,153. The chief metals mined are gold, nickel, copper, silver, and platinum. Lead and zinc deposits are being developed. Ontario is pre-eminent in nickel, supplying over nine-tenths of the world's demand for this metal. One of the most valuable mineral deposits in the world to-day is situated near Sudbury, and contains not only nickel, but high-grade copper ore, as well as important values in platinum, gold, and silver. Ontario holds third place among the world's gold producers. The output of the gold mines at Porcupine and Kirkland Lake in 1929 was valued at $33,543,913. The phenomenal silver field at Cobalt, after twenty-five years' operation, is still producing. Among the non-metallic minerals produced in Ontario are salt, feldspar, graphite, mica, talc, petroleum, and natural gas. An extensive body of lignite coal is being explored by the provincial Department of Mines in the coastal plain of James Bay. Already the diamond-drill has indicated a bed of lignite over two square miles in extent. Vast areas of the northern part of the province have not yet been prospected, and these virgin districts present opportunities for mining enterprise.

Public Health

The organization of medical work and institutions in Ontario received a respectable start from the few surgeons attached to the King's forces in North America who threw in their lot with the original loyalist settlers after the revolutionary war and in later years. The first session of the parliament of Upper Canada concerned itself with the medical needs of these settlers. A medical board was constituted headed by the surgeon of the

THE PARLIAMENT BUILDINGS, TORONTO

NEW GOVERNMENT BUILDINGS, TORONTO

army hospital, and composed of other army surgeons and authorized surgeons and practitioners. The Medical Board of Upper Canada, constituted in 1818, granted licenses till 1839, when the College of Physicians and Surgeons of Upper Canada was created by an Act of the provincial legislature. Soon after Confederation the College of Physicians and Surgeons of Ontario came into being.

There are one hundred and forty-two general hospitals in the province. The patients in these hospitals who are able to do so pay their own way. Otherwise maintenance is paid by the local municipality supplemented by the grant of the provincial government. The nurses trained in these institutions have earned a high reputation in the hospitals of the continent.

Until recent years the government of the province maintained a medical health officer whose duties have gradually developed into the Department of Medical Health. The work of the Department is conducted through a number of divisions; preventable diseases, industrial hygiene, child hygiene, sanitary engineering, vital statistics, dental service, laboratories, public health education, nurse registration. Health instruction is carried to the most remote homes in the sparsely settled sections. Communicable disease control is met by distribution of products for prevention and cure. The laboratories are equipped in modern fashion. Dental services are supplied on a generous scale. A province-wide dental survey of the schools of the province has been carried out. A crusade against tuberculosis is conducted by a travelling diagnostic chest clinic, making early examination possible. The Public Health division conducts press, radio, cinema, school, and exhibitional services, and distributes original literature in considerable quantities. The Industrial Hygiene division is specially active in the mining sections of northern Ontario. Conditions due to inhalation of injurious dust have been in a large measure controlled. The law of the province requires initial and periodic examination of granite cutters. Provision is also made against chromium

poisoning in the list of diseases for which compensation is payable. Investigation of all manner of hazards is carried on in mills and factories. Patent has been applied for by the government of the province for a mask for use by workmen under air pressure. The Department makes inspection of tourist camps and municipal water works.

Ontario spends annually four and a quarter million dollars on the hospitals and charitable institutions of the province. During 1929 a representative commission of laymen began investigation of all matters relating to this form of assistance afforded the sick and dependent. The investigation will be carried into general and private hospitals, sanitaria, homes for incurables and other institutions, particularly into the relations between the government of the province and the governing bodies of the institutions referred to. Methods of other countries in this connection will be studied, and a beneficial programme is expected to result from the work of the commission.

The matter of aid to all hospitals falls under the governmental department of the Provincial Secretary. Nine provincial hospitals devoted to the care and cure of the insane have been established through the province. There is also a hospital for epileptics, one for mental defectives, and a psychiatric hospital. The staff in each of these governmental institutions, called Ontario hospitals, is headed by a qualified medical officer. The supervision reduces red tape to a minimum. In the Hamilton Hospital provision has been made for those physically as well as mentally ill. All hospital buildings are modern. The Ontario Hospital at Whitby is one of the most modern in America, on the cottage plan, and offering facilities for excellent classification of patients. Abundance of sunshine and fresh air is afforded with as much of the homelike character as possible. The equipment of these hospitals is modern in every respect, dental equipment being a feature. The Ontario Hospital for feeble-minded at Orillia would repay a visit.

The department of the Provincial Secretary preserves contact at all times with houses of refuge under municipal

administration. One of the institutions of recent organization is the Boys' Training School at Bowmanville. This unique school will interest all who have studied the influence upon boys of uncertain conditions in their homes.

Social Legislation

Ontario is well advanced in point of social legislation. The Labour Department of the government looks to the welfare of workers in all matters concerning the safety of their employment, health, and working conditions. Marked progress has been attained in co-operation between employers and employees. Government employment offices are maintained and applicants are helped to find opportunities, and when necessary assisted to reach the place of employment. The Ontario Factory Act is a model of its kind in regard to preventing child labour, controlling hours of employment of young persons and women, regulating ventilation, heating, sanitation, removal of hazards to health and safety, and so on. Factory inspection is methodically done. Inspection of steam boilers, issuing certificates to sanitary and hoisting engineers, protection of workers in compressed air, and problems relating to accident prevention are responsibilities of the Department of Labour. The Minimum Wage Act is designed to protect working women against an unrepresentative class of employers, and to sustain wages at the level of decent and wholesome subsistence. The Mother's Allowances Act has been in operation since 1924, and under its provision a total of $12,000,000 has been disbursed. The Old Age Pensions Act came into operation in 1929, making provision for 27,004 pensioners beyond the age of seventy. The Ontario Workmen's Compensation Act, which has been fourteen years in operation, secures to workers all necessary medical, surgical, and hospital attention without any contribution on the part of the workmen themselves. In the total period of operation the financial benefits awarded to workmen and their defendents have amounted to $76,000,000. Over 10,000 workmen and their widows,

children, and dependents are receiving benefits from the Workmen's Compensation Board.

Visitors

In recent years the tourist trade of Ontario has assumed important proportions. The expenditure of summer and winter visitors to the province at a very conservative estimate represents over $150,000,000. The number of visitors by rail, boat, and motor car for long or short stay runs into many millions. The province is admirably adapted for summer visitors. Its mild and invigorating climate, its scenic beauty largely preserved in a natural state, the excellent highways, and the abundance of fish and game have all contributed to an ever increasing tourist traffic, especially from the neighbouring States. Such a mingling of the peoples of two adjoining countries has scarcely a parallel anywhere and tends to promote international good feeling and commercial and intellectual intercourse to an extent that cannot fail to be of enduring benefit to the Empire and to all the English-speaking peoples of the world.

MANITOBA

By the Hon. John Bracken, B.S.A., LL.D.
Prime Minister of Manitoba

MANITOBA enters this year upon the seventh decade of its history as a province, with a new era of its development just begun. In possession now of its heritage of natural resources, this province, in its position of central importance in the Dominion, will continue with increased activity to help in the work of building up and strengthening the fabric of a solidly united Canada based on the welding together of West and East. The only prairie province with a sea-coast, Manitoba sees in the completion this year of the Hudson Bay Railway a new chapter opening in the economic history of Canada. The Manitoba shoreline of the great inland sea into which Hudson broke in his search for the North-West Passage, over which the Company of Adventurers wielded a monopoly dedicated to the fur trade and through which the first white settlers made their way to the Western prairies, is now in process of becoming the commercial seaboard of Canada's awakening northland.

The Natural Resources Question

Since the 1880's the successive governments of Manitoba have sought to have Manitoba placed on an equality of status with the original four provinces in respect to the possession of its own domain. In this Diamond Jubilee year of Manitoba the natural resources question happily has been disposed of at last. It had its root in the fact that the little settlement known as Red River out of which Manitoba grew, did not, like British Columbia, become a crown colony and make a beginning of self-government, and then negotiate for entrance into the Canadian Confederation. One of the first acts of

the first Dominion parliament was to petition the Imperial authority to transfer to Canada the Western area between Ontario and the Rocky Mountains. If sixty years ago certain untoward developments had not happened, the province of Manitoba might have had a more fortunate birth. The deplorable trouble of 1869-70 in Red River began in what was the natural, and within proper limits, justifiable feeling on the part of a considerable element of the population against the transfer to Canada. Under the guidance of a headstrong young man incapable of wise leadership, that opposition, which was based largely on lack of knowledge, fast developed into "the Red River insurrection." When Manitoba was constituted a province on July 15, 1870, it became the fifth member of the family of Confederation, but without possession and control of its natural resources, though it was a basic provision of the Confederation pact by which Ontario, Quebec, New Brunswick, and Nova Scotia united to form the Dominion, that the Dominion authority should derive its revenues from indirect taxation and the provinces should derive theirs from the development of their domains, their natural resources.

The agreement now made between the governments at Ottawa and Winnipeg turns over to the provincial authority the ownership and control of all the natural resources within the limits of the province, with financial arrangements which may here be stated briefly. Manitoba is to receive from now, until its population comes to the 800,000 mark, an annual subsidy of $562,500. When the population is 800,000, the subsidy will be increased to $750,000 a year, until the population numbers 1,200,000. Thereafter the annual subsidy is to be fixed in perpetuity at $1,125,000. Over and above these arrangements for the payment of an annual subsidy, a cash payment to be made on July 15, 1930, amounting to $4,584,212.49, was fixed upon in the agreement, as compensation for earned revenues that should have come to the province in the past sixty years in addition to the total amount received hitherto by the province from the Dominion treasury.

THE HON. JOHN BRACKEN, B.S.A., LL.D.

Prime Minister of Manitoba

The Hudson Bay Route

Before giving further consideration to the natural resources taken over this year by the province, the importance of the approaching opening up of the Hudson Bay route may here claim attention. As early as 1884 a special committee of the Legislative Assembly of Manitoba reported in favour of a railway to the Bay. But though the project was kept continuously before the people of Canada since that time, it did not begin to find definite realization until 1910, when a branch line of the Canadian Northern Railway was completed from Hudson Bay Junction on its Winnipeg-Prince Albert section, to The Pas, and the building of a government line from The Pas to Hudson Bay was authorized by parliament. Churchill was decided upon first as the terminus on the Bay. Before much progress had been made on the building of the railway, it was decided to make Nelson, instead of Churchill, the terminus. Finally in 1927, a controversy having arisen again as to the merits of Nelson and Churchill as terminal harbours, the Dominion government in 1927 retained Mr. Frederick Palmer, an eminent British engineer, to examine both sites and report upon them. His report, strongly in favour of Churchill, led the government to decide upon that harbour.

The construction work of the railway has been completed to Churchill, and the harbour work and creation of port facilities at Churchill are being pushed forward energetically. Towards the expenditures necessary, the Dominion treasury has received some $20,000,000 from the sale of Western public lands, which, under legislation in force from 1908 to 1918, were set aside to provide for the financing of a railway line to the Bay. The possibility of a real estate boom at Churchill, with consequences which have been too often realized in many parts of Western Canada, has been guarded against effectively by the withdrawal of the entire townsite from entry and the announcement that lots are available only by lease from the government of Manitoba. It will be a model town, growing and developing in accordance with carefully made plans.

For more than two hundred and fifty years the Hudson's Bay Company's ships have voyaged in those waters, without any of the modern aids to navigation. Only two or three ships have been lost in all that voyaging. Whaling ships and other vessels have passed through Hudson Strait at various times, as many as thirty-eight having been reported in one season. The heavy ice which drifts down from Foxe Basin through Foxe Channel into Hudson Strait has often delayed ships. A study of the conditions recently completed by air patrols under the direction of the Dominion government indicates that such ice is carried by winds and currents from one side of the Strait to the other, without blocking the whole Strait, and that with permanent observation stations and air patrols, ships will be enabled by the use of radio equipment to navigate the Strait in all kinds of weather. The chain of radio direction-finding and weather-reporting stations to be erected at points along the Strait will be able to communicate with the station at Belle Isle, which is the easterly terminus of the Gulf of St. Lawrence chain, and with Churchill, which connects with the land-line system. There will thus be a complete loop of radio communication around Hudson Bay and Hudson Strait.

The sailing distance from Churchill to Liverpool is approximately the same as from Montreal to the Mersey. The saving of 1,200 miles shipment from Fort William, at the head of Lake Superior, to Montreal, and the attendant transfers, will, it has been calculated, mean a reduction of ten cents per bushel in the cost of exporting Western wheat to Liverpool. The following is a comparative table of sailing distances:

Churchill to Liverpool	2,936 nautical miles
Nelson to Liverpool	2,966 nautical miles
Montreal to Liverpool	2,760 nautical miles
Quebec to Liverpool	2,625 nautical miles
Saint John to Liverpool	2,717 nautical miles
Halifax to Liverpool	2,485 nautical miles
Portland to Liverpool	2,776 nautical miles
New York to Liverpool	3,036 nautical miles

PARLIAMENT BUILDINGS, WINNIPEG

A MANITOBA FARM

The economic possibilities of the Hudson Bay route are not limited to its serviceability as a grain route. Some of the best hay and fodder lands lie in the northern Manitoba clay belt, between the lower Saskatchewan and the upper Nelson and Churchill rivers, and the prospect of shipping cattle on the hoof to the British Isles by the shorter and cooler Bay route, with a reduction to a minimum of the cost of feeding and shrinkage in transit, must also be taken into account. Other resources will contribute their traffic.

The fisheries resources of the Bay are of great volume and importance. The Department of the Interior of the Dominion is now carrying on surveys of the feeding grounds and migratory movements of the musk-oxen and caribou between the Bay and the Arctic and of the regions best suited for the introduction of reindeer herds from Alaska. In view of the continued shrinkage of the available grazing lands of the temperate zones, with the steadily rising cost of meat, it may well be that among the developments at Churchill will be a meat-packing industry. It is worth noting, moreover, that whereas the distance between London and Yokohama, *via* Suez, is 12,000 miles, and by New York and San Francisco about 11,000 miles, the northern route by way of Churchill and Prince Rupert is only 8,000 miles. As in the case of the Panama Canal, the actual trial under competitive working conditions will demonstrate the traffic-drawing merits of the new waterway.

Manitoba's Natural Resources

Among the natural resources of Manitoba, land ranks first in importance. The province is 761 miles from south to north, and has in its southern half a width of 275 miles and in its northern half 485 miles between its eastern and western boundaries, with a total area of nearly 252,000 square miles, of which about 20,000 are covered by lakes and rivers. It is estimated that there are approximately thirty million acres suitable for agriculture. Of this total about one-half is occupied, and only between seven and eight million acres are as yet under cultivation.

A large part of the land area is covered with forests, including several areas that, under Dominion control, have been forest reserves, one of which areas, the Riding Mountain Forest Reserve, is to remain under the ownership of the Dominion government, to be used as a national park. The revenue derived by the Dominion government during the past four years from forests on the public domain in Manitoba was $641,704. The annual production of wealth from the forests of Manitoba is now between five and six million dollars. The fisheries yield a catch which amounts in value to between two and three million dollars annually. The wild animal life is another valuable item in the natural resources. The value of the annual take of furs is large, and the number of fur farms in the province, which in 1920 was two, had increased by 1925 to sixty-four, and is now three hundred and thirty-four.

Manitoba has now reached a stage in its development when it no longer depends solely upon agriculture. Manufacturing, mining, fishing, lumbering, and commercial pursuits are gradually assuming greater importance, and the time has passed when a partial or total failure of any one crop (serious though it may be to individuals) can bring disaster to the province generally. Grain-growing, however, is still the mainstay of agriculture in this province, and wheat the most valuable crop. It is gratifying, therefore, to note that encouraging progress has been reported by the workers at the Dominion Rust Research Laboratory at the Manitoba Agricultural College, and others who are studying the rust problem and endeavouring to produce new varieties of wheat which, besides being rust-resistant, will possess the other desirable qualities for which Manitoba wheat is famous.

Agricultural Production

The total value of all field crops in 1929 was $89,458,000, as compared with the ten year average 1919-1928, $109,676,100, or a decrease of $20,218,100. The amount of land prepared last autumn for this year's crop constitutes almost, if not entirely, a record in the history of Manitoba agriculture, the figures for the year

being as follows: Acres broken, 84,000; summer-fallow, 1,617,000; fall-fallow, 3,462,000; total, 5,163,000. Though the quantity of grain produced last year was low, the quality was unusually high, and the moisture content was small. Not only has the grade of the 1929 crop been exceptionally high, but the protein content has also been distinctly higher than that of the crops of recent years, and the baking tests as well have been superior.

As evidence of the progress of Manitoba in quality production of livestock, it is sufficient to point to the winnings of the Manitoba exhibitors at the Royal Exhibition in Toronto last winter, at which Manitoba took the highest honours of any dairy province, in face of the keenest competition that could be produced in Canada. The total value of Manitoba's dairy products in 1929 reached $14,997,758, compared with a value of $14,133,058 in 1928.

Items of production which deserve mention are poultry and eggs, which in 1929 amounted to $5,454,080, and honey, which amounted to 6,853,600 pounds, worth $822,432. Beekeeping is notably profitable on account of the long hours of summer sunshine. This aids in the exceptional nectar secretion of the white clover, which is widely grown, and of the prairie wild flowers.

Varied Developments of Industry

The total value of the products of Manitoba, mining, forest, fisheries, manufacturing, power sold, fur and some agricultural products, chiefly livestock and livestock products, together with the money actually spent on railways in the north, in power developments at Island Falls and Seven Sisters, in the Flin Flon, Sherritt-Gordon, Mandy and Central Manitoba Mines and in manufacturing plants in the area, represents an aggregate of more than $108,000,000 in the last three years, or $36,000,000 per year.

The actual money already definitely planned to be expended in the next three years on power plant, railways, factories, and proved mines in the area, amounts

to $62,000,000, not to mention other projects that may be, and will probably be, started in the meantime.

Two years ago, in the Flin Flon Mine alone, there was indicated ore of greater value than came out of the Cobalt district in Ontario in the last twenty years; to-day the value of indicated ore of four of the larger mines in Manitoba is nearly twice as great as the twenty year's production of the Cobalt district. Upon the completion of the works being erected at the two larger properties early in 1931, the tonnage of ore daily treated will insure an annual mineral production of over $20,000,000 per year, and this without taking into consideration any new properties that may be developed.

The industrial development during the five-year period between 1924 and 1929, may be briefly summarized as follows: An average of 52 new industries established each year; 45 industries each year expanded their operations; the gross production increased by 66 per cent., or from $97,000,000 to $159,000,000; the capital invested increased by 50 per cent., or from $110,000,000 to $160,000,000; the number of employees doubled, the figures being 14,700 in 1924, and 28,000 in 1929; and the payrolls practically doubled, being $18,200,000 in the earlier year, and $35,720,000 last year.

Mining Developments

Production figures for the mining industry are expected to show a continuation of the same steady increase in mineral production that has been the rule during the past four or five years. The noticeable feature of this industry in 1929 is the commencement of development work in a large way in northern Manitoba and the large number of companies engaged in carrying on exploration work there. Of the established mineral industries, the three most important are based on the non-metallics—cement, stone, and gypsum. Other important non-metallics are clay products, lime, sand, and gravel, but in 1928 each of these products was eclipsed in value by gold production. The year 1929 is expected to show about the same relative

THE FLIN FLON MINES, MANITOBA

values for these different resources, with a substantial increase in the total.

The events that stand out significantly in recent months may be listed briefly as follows:

The Flin Flon branch railway line was completed last year, the Cold Lake Line also was finished, and the Hudson Bay Railway reached Churchill.

The completion of the railways to the mineral-bearing areas of the north has made possible the hauling of vast quantities of machinery and supplies which are necessary for the development planned for these areas. At Flin Flon, the Hudson Bay Mining and Smelting Company has successfully completed its extensive programme of work to date. Many buildings have been erected and about three-fourths of the excavation and foundation work for the whole plant completed. At Island Falls, whence power will be delivered to Flin Flon in 1930, most of the development, preliminary to the installation of turbines, has been accomplished. The completion of the railway to the Sherritt-Gordon mines has permitted that company to commence the installation of a plant for the milling of 1,500 tons per day.

Exploration work is being carried on at the Mandy mine and on a number of other copper prospects in northern Manitoba. Central Manitoba mines are continuing to produce gold at the rate of about $45,000 per month, and extensive underground work has been carried on. Development work has been done in the same district on two properties the San Antonio and Gem Lake Mines. The vicinity of Winnipeg and Bird Rivers is the scene of extensive surface and underground prospecting for tin and associated minerals.

It may be noted that the Western Stone Company closed the largest contract ever awarded for Tyndall stone with the T. Eaton Company, Toronto. During the next few years the Tyndall quarries, less than thirty miles northeast of Winnipeg, will supply 1,000,000 cubic feet for that company's new Toronto store. They have also secured another large contract with the Alberta government for stone for the new administration building

at Edmonton. The remarkable qualities of the Tyndall building stone, of which there is a very extensive deposit in Manitoba, are rapidly bringing it widely into use and making it known beyond the borders of Manitoba as a building stone of the highest value and desirability. The Parliament building at Ottawa and the Legislative building in Winnipeg are among the many structures which furnish excellent examples of the beauty of this mottled limestone, which a leading Chicago architect has described it as "tapestried stone".

Among the recent industrial developments making use of the non-metallic mineral resources of Manitoba may be mentioned a glass factory which began operation last year, using a glass sand of which there is a large deposit on Black Island in Lake Winnipeg.

Sixty years ago, if an observer with a superhuman range of eyesight could have gone up in an aeroplane high enough to have had a view of what is now Western Canada from Lake Superior to the Rocky Mountains, he would have been looking down upon a vast wilderness. This area, which includes the whole of the present provinces of Manitoba, Saskatchewan, and Alberta, was then a waste in which, save in a few isolated localities, no mark had been made by man. The only records written on the prairies of activities other than those of the changing seasons, were the buffalo trails across the face of those vast expanses, on which there was but one place where settlement had passed beyond the stage of the clustering of a few hunters' families about a trading post. It had Fort Garry, the walled headquarters of the Hudson's Bay Company, as its centre, and was strung along the Red and Assiniboine Rivers, whose junction was the site of the future city of Winnipeg, where a small village stood at that time adjoining Fort Garry—a village of less than a score of log buildings. Not even the most visionary among the dwellers at the junction of the Red and the Assiniboine sixty years ago, it is safe to say, dreamed of what the coming years held in store—wheat fields stretching to the circling skyline, the growth of diversified agriculture, the towns and cities linked by a

network of railways radiating from Winnipeg and covering the whole West, and industry and prosperity spreading throughout the length and breadth of that empty vastness which General Butler, whose famous book was published in 1872, described in the title he gave that book as "The Great Lone Land".

The total population of the newly-made province of Manitoba, as determined by the census taken in October, 1870, was 11,963, of whom 1,565 were white, 9,840 were of mixed white and Indian blood, of whom 5,757 were French-speaking and 4,083 English-speaking. Farming was not pursued on any extensive scale. Directly or indirectly, the whole community lived mainly upon the proceeds of the buffalo-hunting. In a few years time those conditions had passed away forever. The Dominion census of 1881 showed that the population of Winnipeg was then 62,260. The census of 1891 showed it to be 152,506. The census of 1926 gave the population of Manitoba as 639,056.

Developments of Transportation

In 1870, there was a mail service to and from Fort Garry and the East once a week by way of Pembina, St. Paul, and Chicago. Between Winnipeg and St. Cloud in Minnesota, where the railway ended, the mail was carried by horses in summer and by dog train in winter. There was neither stage line nor steamboat running to or from Winnipeg for the carrying of passengers, and a traveller had therefore to depend upon his own resources. When the Hon. Adams G. Archibald, the first lieutenant-governor of Manitoba, arrived in Winnipeg on September 2, 1870, he came by canoe from Pembina. The first party of immigrants arrived on April 26, 1871, from Ontario. It consisted of eight men who had taken four weeks to make the journey. They arrived on a flat boat which they had navigated down the Red River, from Moorhead, in Minnesota.

One of the first things done after the establishment of the province was the construction of a telegraph line to

Pembina. The first telegram from Winnipeg was sent on November 20, 1871 by Lieutenant-Governor Archibald, to the Governor-General at Ottawa. On April 3, 1875, ground was broken at Port Arthur on Lake Superior, for the construction of the Canadian Pacific Railway to Winnipeg. In October, 1876, the first shipment of wheat, consisting of 857 bushels, was made from Manitoba; it went from Winnipeg by boat on the Red River to the end of the railway in Minnesota, and from there by way of St. Paul and Chicago to Toronto, where it was sold as seed wheat.

The first train over the first railway to be operated in Manitoba, which was called the Pembina branch of the Canadian Pacific, made the run from Emerson to St. Boniface, across the river from Winnipeg, on December 7, 1878; it was only in 1877 that the tri-weekly stage service under contract with the government which had been established in 1871 between Abercrombie, in Minnesota, and Winnipeg, had become a daily service. In 1872 the appearance on the Red River of the stern-wheel steamer *Selkirk*, owned by James J. Hill, of St. Paul, an active young Canadian who was destined to play an important part in railway development, meant the ending of the old picturesque cross-country freighting by caravans of loudly-creaking Red River carts. By 1874 there were seven steamers plying on the Red.

The formation of the St. Paul, Minneapolis, and Manitoba Railway Company, 1879, under the presidency of George Stephen, with James J. Hill as general manager, and Donald A. Smith, as one of the board of directors, inaugurated an undertaking which had developments culminating in the completion six years later of the Canadian Pacific Railway from Montreal to Vancouver. The first Canadian Pacific Railway train from the East arrived in Winnipeg on July 26, 1881, and the first transcontinental train of the Canadian Pacific Railway, from Montreal to Vancouver, passed through Winnipeg on July 1, 1886. From the beginning the problems of transportation have been among the master problems of the West. With the completion of the first transcontin-

ental railway system development began to go forward rapidly. The year 1896 saw the beginning of the Canadian Northern Railway, and 1904 the beginning of the Grand Trunk Pacific. These two systems eventually became merged in the Canadian National Railways.

Cities and Towns of Manitoba

The growth of Winnipeg, which was incorporated as a city in 1873, and is now the third city in the Dominion, has kept pace with the development of the West. The situation of Winnipeg as "the neck of the bottle" for railway traffic converging eastward and diverging westward has made it the gateway and business headquarters of Western Canada, and it has made the Winnipeg cash wheat market the greatest in the world, with bank clearings normally equalled in Canada only by those of Montreal and Toronto. The second city of Manitoba, Brandon, which began as a city of tents in 1880, is the most active agricultural centre in the province, a progressive city with a large volume of business. The great winter and summer fairs, held in spacious buildings and grounds, have made the name of Brandon known all over the continent. More than twenty years ago such large quantities of wheat were marketed there that Brandon became known as the Wheat City. St. Boniface, the third largest city in the province, is an important commercial and manufacturing centre, linked by bridges to Winnipeg. Portage la Prairie is a solidly built and prosperous city, and like Brandon, is the centre of a region in which diversified agriculture is carried to its highest stage of development. It has grown from one of the oldest settlements in the West, mentioned in the fur-traders' records early in the last century. Selkirk in the 1870's was a rival of Winnipeg; for several years it was believed that the Canadian Pacific Railway would cross the Red River at Selkirk. The first settlers went into the Morden district in 1874. The settlement of the Neepawa and Souris districts came soon afterwards; and it was not until the building of the Canadian Northern that the

development of the Dauphin district began to go forward rapidly. In Carman, Dauphin, Minnedosa, Morden, Neepawa, Selkirk, Souris, Stonewall, The Pas, Transcona and Virden, to name only these, Manitoba has thriving business centres.

SASKATCHEWAN

By the Hon. J. T. M. Anderson, M.A., LL.B., D.Pæd.

Prime Minister of Saskatchewan

M. CONSTANTIN-WEYER, the author of *A Man Scans his Past*, is quoted by his translator in the preface to that work as saying: "I am a prey to a vast ambition. I wish to paint as many fragments as possible of a vast fresco of Canada." The Goncourt prize-winner, in the work referred to, succeeded in creating one of the fragments—a striking, central fragment—of the fresco of his dreams. He has painted a fragment which, in stark, arresting detail, portrays the change which time and pioneer hands have wrought in the prairie west. He himself witnessed that transition; for the wonder of it is that the change has come within living memory. A short span of little more than half a century separates the Saskatchwan of the Indian and the buffalo from the Saskatchewan of to-day. And the transition goes on, ceaselessly.

It is in the light of its youth that Saskatchewan should be viewed and its progress studied. In that perspective, the contrasts startle and intrigue.

Twenty-five years ago, the province of Saskatchewan was carved from the old North West Territories with its sister province, Alberta, and became a member of the Canadian Confederation. In these twenty-five years Saskatchewan, from small beginnings, has leaped to the forefront of the provinces. It leads in value of field crops and of agricultural lands; it stands first in production of wheat and other cereal crops; it ranks second in gross agricultural wealth and revenue, and is second only to Ontario in mileage of steam railways. The province now takes third place in point of population and, such has been the attraction of its unrivalled soil, it is

the most truly rural province of Canada, with the possible exception of little Prince Edward Island.

The cycle of progress and economic change has brought other developments in its train. Saskatchewan, for example, has more rural telephones *per capita* than any province or country of the world, excepting Sweden. Mechanization of the farm has reached a more advanced stage than elsewhere in the Dominion. More significant still for so young a country, Saskatchewan has the lowest death-rate from tuberculosis of all the provinces, and the lowest recorded death-rate of any country in the world maintaining a bureau of vital statistics.

This summary of outstanding achievement, necessarily brief, but possible of considerable augmentation, demonstrates that Saskatchewan's progress during the twenty-five years of its existence as a province has been substantial as well as rapid. Visualize the change! Within the short space of twenty-five years, despite the retarding influence of the war and its aftermath, the vast expanse of prairie land, which forms so large a portion of its surface area, has been converted from grass-grown wilderness into a smiling and fruitful plain dotted with thriving populous communities, whose pleasant farm homes, sweeping in series to far horizons, testify to an independence won from what was, within living memory, the grazing ground of buffalo herds and the hunting ground of native tribes.

Saskatchewan's history during the first quarter-century of its existence as a province has been epic of the soil. Agriculture, the basic industry, indeed for many years virtually the sole industry of its people, has been the *fons et origo* of its present wealth and development. Agriculture, too, has undergone change. Originally, straight grain-farming absorbed the attention of the agricultural community, but, in efforts to ensure economic stability, Saskatchewan farmers have turned more and more toward diversified farming and, as a result, the province rapidly is assuming its place as the leading live-stock producer of Canada.

Saskatchewan has an area of 251,700 square miles,

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Prime Minister of Saskatchewan

or 161,088,000 acres, including a water area of 5,323,520 acres. The province is twice as large as the British Isles, as large as the whole of France, Belgium, and Holland combined, and larger than the whole of Germany. Approximately 70,000,000 acres are suitable for agriculture and 58,000,000 for crops; yet, to date, less than 30,000,000 acres have been brought under cultivation. Saskatchewan, therefore, despite the fact it already is the greatest wheat-producing province, has enormous possibilities of further development in that direction.

The contrast between the Saskatchewan of yesterday and the province of to-day is vividly displayed in the growth of population. In 1901, the total population of the North West Territories, including what is now the provinces of Alberta and Saskatchewan and the Yukon Territory, was given as 48,000. By 1905, the tide of immigration had started to flow Saskatchewan-ward, and in that year the population of the province was estimated at 250,000. In 1929, Dominion government estimates place the population at 866,700.

When the province came into being in 1905, there were some 60,000 farms of one acre and over which produced, in that year, from 2,000,000 acres under crops, a total of 60,000,000 bushels. If we take 1927 as being more typical of the average than either 1928 or 1929, with approximately 120,000 farms and 26,000,000 acres under crops, the yield that year approximated 400,000,000 bushels, of which 213,000,000 bushels were wheat. The curve of progress has risen sharply, therefore, but it has not been in one unbroken sweep. Serious problems have been faced and solved; occasional periods of depression and virtual stagnation have been encountered. In surmounting their difficulties, however, the character of the people has been steeled and tempered—and again the curve has taken its upward swing.

The gross agricultural wealth of Saskatchewan in 1928 was estimated at $1,831,215,000, which is equivalent to $2,148.84 *per capita* of population and of $15,547.65 per occupied farm. Gross agricultural revenue in Saskatchewan in 1928 was $407,039,000; and it is

interesting to note that, for the four-year period from 1925 to 1928 inclusive, an average annual revenue per occupied farm of $3,445.90 was recorded.

Concomitant with growth of population and development of the basic industry came necessity for providing facilities to enable farmers to get their produce to market. In 1905, there were some 600 miles of main market roads in Saskatchewan and no provincial highway system. To-day, there are 25,000 miles of main market roads and a provincial highway system, of which 4,000 miles of the allotted 7,300 miles have been completed to standard. Railway construction in the province reveals a similarly impressive growth. In 1905, 1,176 miles of railway traversed the province, while to-day the mileage exceeds 8,000, and heavy construction programmes adopted by the two great railway companies of Canada will, when completed, considerably augment that total. The trend of railway construction at the present time is northward; the fingers of steel are probing into the yet unexploited wealth of Saskatchewan's northern metalliferous hinterland, and to Canada's new Atlantic seaport—Churchill on the Hudson Bay.

Agriculture, as previously stated, has absorbed the attention of the people of Saskatchewan for the major portion of the twenty-five years of the province's existence. Manufacturing, until very recent years, had made little progress except in the case of industries directly related to, or dependent upon, agriculture. There were large flour mills, several packing plants, many creameries; but of industries based on the known natural resources of the province there were few, and these were of minor importance. The new transition is toward industrial diversification.

Industrially, Saskatchewan's greatest stimulus was felt a year or two ago with establishment in the southern part of the province of a great assembling plant for automobiles, which brought in its train a number of allied industries. Recognizing the strategic position of the province as the central distributing point in Canada, great manufacturing concerns have established branch factories in

Saskatchewan, and the tremendous impetus given to development by this and similar movements has had immediate reflex in almost unparalleled building activity and an influx of new population to the urban centres. While available figures relative to manufacturing progress do not include first year's production of the new industries referred to, it is significant of the trend that, within the past four years, Saskatchewan's manufactures have doubled in annual value. This is indicative of the fact that existing industries, keeping pace with general progress, have been expanding rapidly.

This expansion has been most noteworthy in connection with those industries based on the great natural resources of the southern portion of the province. Within that southern area lie great deposits of lignite coal, estimated to contain 60,000,000,000 metric tons in close proximity to Canada's greatest deposits of commercial clays. British capital has contributed considerably to the development of the coal industry in Saskatchewan with the establishment of a briquetting industry wherein, by adaptation of the Lurgi process, the low grade lignite is converted into a domestic fuel of high calorific value. Annual production, which heretofore has remained around 400,000 tons, has risen considerably as result of the fillip thus given the industry.

Saskatchewan clays have been pronounced by ceramic experts to excel those of any province of Canada, and upon this they base the prediction that Saskatchewan will lead the Dominion in clay-working industries. Deposits of virtually unlimited extent, containing varieties suitable for the manufacture of a wide range of commodities from coarse brick to fine semi-chinaware, are found distributed over a wide area of the province. Its deposits of ball clays are unique in Canada and in quality rank with the best British and American clays.

In the south-central portion of the province are found extensive deposits of sodium sulphate, commercial development of which is proceeding apace. Saskatchewan easily leads the Dominion in this resource; as a matter of fact, it is the only province of Canada in which such

deposits occur naturally. There are 200 known deposits of sodium sulphate in the province, and 20 of the larger of these are estimated to contain 100,000,000 tons of the hydrous salt. In 1928, three plants producing sodium sulphate commercially had an output of 6,000 tons. A new plant now is in course of construction, production from which, already contracted for, will increase the total for the province by 500 per cent. Volcanic ash and Bentonite are other non-metallic minerals found in Saskatchewan for which a steadily growing market is being created, and upon which industries are being founded.

Metallic minerals of unknown quantity and possibly of great potential value occur throughout the Precambrian formation which covers virtually the entire northern section of the province in which gold, silver, copper, zinc, and other metals are known to exist. Active prospecting, stimulated by recent developments in similar structures in northern Manitoba, is in full swing, and several promising discoveries have been reported. It is significant that the great Flin-Flon mining project, which straddles the Manitoba-Saskatchewan boundary, is predominantly a Saskatchewan project. Not only is 77 per cent. of its copper-zinc ore body located in this province, but power for it and other mining developments in northern Manitoba will be supplied from a hydro-electric plant at Island Falls on the Churchill River, in Saskatchewan. This plant is now near completion.

Abundance of cheap power for industrial development is assured in Saskatchewan, whether it be produced from the coalfields of the south or at the power sites on its northern rivers. The government of Saskatchewan is committed to a policy of public ownership of the sources of power, and it is noteworthy that, while the Island Falls project is primarily a private venture, the lease secures for the people of Saskatchewan one-sixth of the power developed at the site, if and when required, for all time. More than one million horse-power of energy

SASKATCHEWAN'S PROVINCIAL LEGISLATIVE BUILDINGS, SITUATED ON THE SHORES OF WASCANA LAKE AT REGINA

A SUMMER EVENING ON WASCANA LAKE, REGINA, SASKATCHEWAN

A NEWLY FINISHED "OIL AND GRAVEL" HIGHWAY IN SASKATCHEWAN

A DOG TEAM IN NORTHERN SASKATCHEWAN

COMBINED HARVESTER AND THRESHER CUTTING WHEAT ON A FARM NEAR REGINA, SASK.

THE TIPPLE OF A COAL MINE AT TAYLORTON IN THE ESTEVAN COAL FIELDS OF SOUTHERN SASKATCHEWAN

lies latent in the swift streams of northern Saskatchewan, according to Dominion government estimates.

The forests of northern Saskatchewan are productive of marketable jack pine, spruce, and tamarack timber. Though present production is relatively small, it is estimated that there are 8,000,000,000 board feet of lumber and 72,000,000 cords of pulpwood in the province, not to mention millions of cords of smaller timber suitable for fuel.

Sheltered in the forests and bluffs of Saskatchewan are found many species of big game and small fur-bearing animals, the latter being the basis of a thriving fur industry which is gradually assuming first-rate commercial importance. More than 1,000,000 pelts were taken in 1929, which were valued at $2,206,179.

Saskatchewan's commercial fisheries, too, gradually are coming into their own. Production has virtually doubled in the last six years, and now has an annual value of approximately $600,000. As transportation facilities are carried farther into the northland, some of the larger but more remote bodies of water, where fish abound in enormous quantities, will be capable of commercial exploitation, and a marked development of the industry ensue in consequence. Upon this wealth and variety of natural resources rests Saskatchewan's unbounded confidence in the future of the province.

Saskatchewan's development has not however been confined to material things. Education and public health are two matters which the people have taken seriously, and concerning which they have spared neither expense nor endeavour to provide the most advanced facilities. In 1905, Saskatchewan had 896 school districts. Now there are approximately 5,000, employing more than 8,600 teachers, and with a total pupil enrolment of 225,000 in elementary and high schools. Three up-to-date normal schools have been found necessary to maintain the supply of trained teachers to keep pace with the steadily increasing demand, while a magnificent provincial university, with a College of Agriculture, occupies a site of 1,582 acres overlooking the city of Saskatoon.

ALBERTA

By the Hon. J. E. Brownlee, K.C.

Prime Minister of Alberta

THIS year Alberta celebrates the twenty-fifth anniversary of its life as a province. In that time its population has increased sevenfold; its urban centres have grown from insignificant beginnings to civic communities already strong both in people and resources; the ranching industry has been replaced by diversified farming; settlement which was originally confined to the southern half of the province has extended well into the northern portion, and is ever pushing back the frontiers of the wilderness and adding to the already imposing total of productive land; transportation facilities of all kinds have kept pace with the march of development, and made conveniently accessible areas which a quarter of a century ago could only have been reached after long tedious and risky journeys, and which were then regarded as of little practical use; the growth of commerce and manufacturing industry has been in proportion to the agricultural progress; the resources of the province are being steadily prospected and developed; coal deposits, now recognized as immense, are being worked to a point where the capacity output can supply the fixed wants of all western Canada, and are capable of filling almost any conceivable demand for an unlimited time; the exploration already undertaken for gas and oil in Turner Valley, the Wainwright district, and elsewhere, indicates gas and oil fields of importance; a present supply of natural gas of enormous value for domestic and industrial purposes has been obtained; the production of naphtha promises to reach a considerable volume, and justifies the confident expectation that the province may eventually become an important factor in the production of oil and gasoline.

THE HON. J. E. BROWNLEE, K.C.

Prime Minister of Alberta

In many directions active steps are being taken to make available for the use of many resources with which the province is known to be endowed. In the vicinity of McMurray are large deposits of shale and bituminous sands which are on the eve of being exploited commercially on a large scale. The mineral deposits in the far north are being intensively examined. Much of this wealth is at the moment located far from the means of transportation, and so cannot be profitably worked; but, having regard to the rate of progress of the province and the advance of transportation means and methods, he would be bold indeed who would deny the probability of making the wealth of the north accessible within a relatively short period.

While the material development of the province has been spectacular, its achievements in other ways have been no less phenomenal. The provincial and municipal institutions have been founded, built up, and extended so as to provide the people with the benefits of civilization whether they live in well-settled localities or in pioneering communities. Ample provision has been made for the preservation of law and order. It has been made possible for every child in the province to obtain an education which will compare favourably with that obtainable anywhere in other parts of Canada. The University of Alberta is an institution of which any people might be proud, and in the schools of the province a standard is maintained which is not inferior to the best which can be found in similar institutions elsewhere.

In a great variety of ways the province has been in the van of progress. The health and physical well-being of the people have been recognized as problems which are the concern of the community. Medical, hospital, and clinical services have been instituted on a plan and scale which promises to effect much for the betterment of the people as a whole, and to improve vastly the lot of those who reside at places remote from urban centres.

The land on which so much has already been achieved is blessed by Providence with great beauty and a kindly climate. Its long sunny days contribute alike to the

prosperity and happiness of its people; the beauties of its scenery are a source of enduring enjoyment. Nowhere else can be found scenery more grand or alluring than that of the eastern slopes of the Rockies. Alberta takes great great pride and joy in its natural amenities, and seeks at the same time to make them accessible and to preserve them for posterity. Huge areas have been set aside and are maintained as national parks and each offers to the holiday-maker and traveller an endless variety of interest and appeal; each adds an invaluable contribution to the sum of happiness alike of those who have made their homes in the provinces and those who are transient visitors from other lands.

A PANORAMA IN THE NAMAO DISTRICT, ALBERTA

MALIGNE LAKE, JASPER NATIONAL PARK

BRITISH COLUMBIA

By the Hon. S. F. Tolmie, P.C.

Prime Minister of British Columbia

BRITISH COLUMBIA is Canada's westernmost province and the geographic centre of the British Empire. It is difficult for one who was born in British Columbia in the days when it was just emerging from the wilderness state and who has watched its rapid development to write or speak of the province without using superlatives which must seem unwarranted to those who have never visited Canada's Pacific Coast.

The history of the province forms a rare and romantic chapter in the story of Canada, and in the chronicles of the British Empire. Here we have a country that boasts all the comforts and advantages of modern science and civilization; with great cities and seaports that are important factors in the trade and commercial arrangements of the world; with modern public institutions and advanced social services—and we have with us, taking active interest in the varying problems and incidents of daily affairs, men who were born in the country when it was an unmapped and unorganized wilderness, and the only known civilization was that which was enclosed within the stockaded walls of Hudson's Bay Company trading posts.

Thus within the memory of persons still living in British Columbia there have been brought about changes that are comparable to the difference in civilization in England in the days of the Roman conquest and that of the present era. Eighty years ago money was worthless as a medium of exchange in the trade of this country; animal furs and salmon for food alone held value to the trader in his work of barter; while cloth, blankets, and trinkets were acceptable to the head-hunting and warlike savages who came to trade before the guarded gates of

the palisaded establishments of the great British company.

To-day it is our boast that British Columbia is a law-abiding land, and serious offences against the Criminal Code among the natives are rare. The canoe that in the earlier times was the mainstay of coastal transportation has been superseded by palatial steamers, comfortable motor launches, and the more modern method of air travel; while the slow-moving stage coach of colonial days has given place to 100,000 automobiles that cover the distances on the 18,000 miles of provincial highways.

Such is the romance of British Columbia within the span of the memory of men and women still living. My own recollections go back to the days when British Columbia was a crown colony, and to the days before the whistle of the locomotive had been heard west of the Rocky Mountains.

The romance of the Coast commenced with the coming of Captain Cook in 1778 on the voyage which cost him his life, but which gave to the British Crown her Pacific possessions and to seafarers of that time the greatest boon that they had ever had bestowed upon them—victory over the dread scourge of scurvy.

Ten years later another British navigator, Captain John Meares, was the cause of consolidating the right of Great Britain to the coast line of what is now British Columbia. Meares, a man whose character it is difficult to weigh correctly, came to the Coast not alone as a fur-trader, but in search of ginseng root for the medicos of ancient China.

It is but another stone in the bridge of romance that to-day British Columbia is finding great favour, by reason of her invigorating climate, as a place of refuge to Europeans in the Orient who are in search of health. And further, while some ginseng is shipped across the Pacific to the apothecaries of China, it is the big red apple of British Columbia that is regarded there as a valuable article of diet suited to the climate. This is a trade that gives promise of great development.

China is developing Occidental tastes, and included

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in the miscellaneous cargoes that cross the Pacific from Vancouver and Victoria are shipments of ice-cream.

Month by month the water-borne exports of British Columbia are growing and the importance of this province, which has been described as the "Cross Roads of Empire," is increasing.

But little more than forty years ago, Vancouver was but a collection of rough shacks clustered about a saw-mill. To-day the trade of the port rivals that of San Francisco, and nearly fifty lines of deep-sea freighters make regular sailings from the harbour to all parts of the world.

In size British Columbia equals the combined areas of the British Isles, Belgium, Norway, Denmark and Holland. Within its borders are amassed such a wealth of natural resources as are not to be found in any other portion of the North American continent.

Arable lands suitable for mixed farming, dairying, poultry-raising and the other various pursuits of agriculture have been estimated at 22,000,000 acres. In addition to this huge total there are no less than 148,000,000 acres suitable for ranging cattle and sheep, making in all 170,000,000 acres of land that may be utilized for the production of food stuffs. Tens of millions of persons could be fed from the products that British Columbia could produce from her idle acres.

The province is often referred to as possessing the last great stand of soft-woods in the Empire. It is estimated that the forests of British Columbia contain 366,000-000,000 feet board measure of lumber, with an annual growth much larger than the annual utilization by cutting. This, however, does not indicate that there is such a superabundance of timber that care need not be exercised for its preservation, for forest fire depletion is heavy. It is hoped that by wise and careful methods of reforestation and continual care the lumber industry may, indeed, be preserved for all time.

This is an age of large figures, and we are as a result not prone to measure in our minds the meaning of totals given in millions and thousands of millions. This is so

in connection with lumber. To say that the forests of the province contain 366 billion feet of lumber does not register, perhaps, as much as would an illustration of what could be done with that total of timber. It would permit of the construction of a board walk half a mile wide around the earth at the equator and leave enough over to construct a city for half a million persons.

While our timber resources are of enormous value and may be computed in dollars and cents, it is impossible to state correctly or even guess at the mineral wealth of British Columbia. Last year the mines of the province produced in excess of $70,000,000. Almost every week new discoveries are reported. Every section of British Columbia is known to be mineralized, and evidences have been found to show that practically every mineral known to exist on the continent is found to some extent in British Columbia.

Although mining has been carried on actively for the past seventy years, it has been estimated that if all the lands that have been thoroughly examined for minerals were to be congregated in one block it would only be about 65 miles square. This will, perhaps, indicate the enormous possibilities that exist within British Columbia for mining development.

Among the operating mines are such producers as the Sullivan at Kimberley, which is regarded as the largest producer of silver-lead-zinc ores in the world, and the Britannia, near Vancouver, which is accounted to be the largest copper mine in the Empire.

The metallurgical plant of the Consolidated Mining & Smelting Company of Canada, at Trail, is the foremost establishment of its kind in the world. It is being greatly enlarged, and new operations are constantly being undertaken. At the present time an investment of $8,000,000 is being incurred for the erection of a plant for the making of super-phosphates. Cadmium and bismuth are recent productions.

With its 7,000 miles of tidal coast, and with its great river systems, British Columbia has long enjoyed prominence as a producer of fishery wealth. Intensive fishing

SCENIC MOTOR ROAD IN FRASER VALLEY, BRITISH COLUMBIA

has reduced of late years the volume of salmon catches, but there remain vast fisheries that have never been systematically exploited. These include cod, sole, flounder, brill and other flat fish of edible varieties. Like salmon, halibut has been intensively fished for years, and the fisheries are now under the jurisdiction of an international joint commission that directs operations to permit of proper reseeding of the banks. Whaling is another marine industry. Pilchards and herring are caught in great quantities.

To these four basic resources must be added a fifth, which British Columbia enjoys in well-placed abundance. This is the water-power wealth of the country. The tumultuous streams of the province are capable of providing a very large amount of hydro-electric energy. It has been computed that in the southern half of British Columbia there are 6,000,000 horse power capable of development. The tumbling rivers of the northern portion have not yet been fully estimated, but are known to be enormous.

The immense deposits of coal in various portions of British Columbia offer further attractiveness to the country from an industrial standpoint.

When, in addition to these natural resources are added a most healthful and temperate climate and scenic beauties that defy comparison, justification may easily be established for the claim that British Columbia is the most favoured portion of the New World.

The social organization and educational facilities of British Columbia are second to none, while the per capita outlay for these advantages is far beyond those of other provinces. Included in the services may be mentioned up-to-date hospitalization, homes for the aged, sanitariums for those inflicted with tuberculosis and incurable ailments, mental asylums, old age residences, old age pensions, workmen's compensation, widows and mother's pensions, and low succession duties. In relation to the last named, at the recent session of the Legislature death duties were entirely removed from life insurance

to direct beneficiaries and from all estates up to $20,000. On larger estates the rates are very moderate.

The educational system includes primary schools, high schools, technical schools, normal schools and a state-operated university with which are associated colleges. In addition, the province operates correspondence courses in elementary and high school studies for pupils situated in remote localities throughout the province. These have proved to be very successful and beneficial.

It is impossible to describe adequately the scenic beauties of the province. They must be seen to be appreciated. Each year sees a larger influx of tourists who come to enjoy the varied beauties of the province. Conservatively estimated, this trade was worth $73,000,000 to British Columbia last year.